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THE ASVAB SCORE SCALES: 1980 AND WORLD WAR II

Milton H. Maier
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THE ASVAB SCORE SCALES:
1980 AND WORLD WAR II

Milton H. Maier
William H. Sims

Marine Corps Operations Analysis Group

ABSTRACT

This report describes the construction of a new score scale for the Armed Services Vocational Aptitude Battery (ASVAB). The ASVAB was administered to a nationally representative sample of young adults in the fall of 1980. The test scores for this sample were used to construct the new score scale, called the 1980 ASVAB score scale. The 1980 score scale replaced the World War II scale, used by the Department of Defense (DOD) since 1950, on 1 October 1984. The new score scale provides nationally representative test norms that enable DOD personnel and manpower managers to compare the aptitudes of military recruits with those of the potential supply of recruits in the civilian youth population.

EXECUTIVE SUMMARY

The Armed Services Vocational Aptitude Battery (ASVAB) is widely used for a variety of purposes:

- Military services use it to help determine qualification of applicants for enlistment and to help assign recruits to occupational specialties.

- Congress and military manpower managers use it in manpower planning and to help structure the distribution of mental aptitudes in the services.

- Civilian students and counselors use it in career exploration and vocational guidance.

The utility of the ASVAB is strongly tied to the existence of a stable, well-defined score scale. It is through the score scale that meaning is attached to test scores.

PURPOSE OF REPORT

On October 1, 1984, a new score scale was introduced for ASVAB. The purpose of this report is to describe the construction of the new ASVAB score scale and test norms referenced to the 1980 population of American youth and the equating of the new scale with the old one, which was based on the World War II population. The report is also intended to provide extensive historical information and perspective on the old score scale.

This report integrates various published and unpublished analyses performed on the score scales over a number of years by both the Center for Naval Analyses (CNA) and the Air Force Human Resources Laboratory (AFHRL). Background information on the World War II score scale is taken primarily from work conducted by the Army Research Institute (ARI) and from unpublished research notes collected by Maier.

BACKGROUND

The ASVAB was introduced in 1968 as the first joint-service test for use in the Institutional Testing Program. Each year the ASVAB is given to

hundreds of thousands of students in thousands of high schools and post-secondary schools. In 1976 the services began using the ASVAB for selecting recruits and assigning them to occupational specialties. As was true for predecessor military tests since 1950, the ASVAB scores were referenced to the scores of a sample of men who entered the Armed Forces in 1944 and took a similar test; that is, the distribution of ASVAB scores was forced to have the same distribution as the scores of this 1944 sample, which is referred to as the *World War II* (WWII) *Mobilization, or Reference, Population.*

The reason for referencing test scores to a fixed population is to establish and maintain stable meaning of the scores in terms of predicted, or expected, performance in occupational training courses. The accuracy of personnel decisions and manpower planning is directly dependent on how validly the tests predict performance. The stable score scale enabled managers to make reasonably accurate selection decisions based on predictions about how well people with different levels of aptitude scores would perform in training courses. Because the ASVAB and predecessor tests had a history as valid predictors, personnel managers generally were confident about the decisions based on the ASVAB.

Following the introduction of forms 5, 6, and 7 of the ASVAB (ASVAB 5/6/7) in 1976, however, the test scores were found to be too high compared with their traditional meaning; that is, many people appeared to be qualified for enlistment, when in fact their true level of expected performance, compared to the WWII Mobilization Population, would have placed them in the unqualified group. During the late 1970s about one-quarter of all recruits would not have qualified for enlistment if the scores had been accurately referenced to the WWII Mobilization Population.

The inflated score scale was fixed in October 1980, when a new version of the ASVAB, forms 8, 9, and 10 (ASVAB 8/9/10), was introduced. These scores were accurately referenced to the WWII Mobilization Population, and the traditional meaning of the ASVAB scores in terms of expected performance was restored. Test users could once again make personnel decisions with confidence that the test scores accurately indicated traditional levels of expected performance.

The ASVAB 8/9/10 subtests are listed in table I. The subtests are combined into composites that are used for making personnel and manpower decisions.

TABLE I

SUBTESTS IN ASVAB 8/9/10

Subtest		Number of items	Time limit (min)	Description
Title	Symbol			
General Science	GS	25	11	Knowledge of physical and biological sciences
Arithmetic Reasoning	AR	30	36	Understanding how to solve word problems
Word Knowledge[a]	WK	35	11	Knowledge of the meaning of words
Paragraph Comprehension[a]	PC	15	13	Understanding the meaning of paragraphs
Numerical Operations	NO	50	3	A speeded test of simple arithmetic
Coding Speed	CS	84	7	A speeded test of matching words and numbers
Auto/Shop Information	AS	25	11	Knowledge of automobiles and use of tools
Math Knowledge	MK	25	24	Knowledge of algebra, geometry, and fractions
Mechanical Comprehension	MC	25	19	Understanding of mechanical principles
Electronics Information	EI	20	9	Knowledge of electronics

a   The raw scores (number of items correct) for these two subtests are added to form the Verbal (VE) score.

COMPARING APTITUDES OF RECRUITS TO THE CURRENT YOUTH POPULATION

For manpower planning purposes, an important piece of information is the distribution of ability in the current population of potential recruits. Recruiting goals are established in part on the basis of how many potential recruits at different ability levels are available in the full population. Since the draft was suspended in 1973, the military services have had to compete with other employers and with academic institutions for qualified young people. ASVAB scores serve as the primary basis for evaluating the aptitudes of recruits relative to those of the potential supply.

Before 1980 the best basis for estimating the distribution of ability in the supply of potential recruits was the WWII Mobilization Population, which consisted of the males who served under arms during WWII. Between WWII and the late 1970s, educational and cultural changes (the arrival of television, for example) took place in society that may have shifted the distribution of mental aptitudes.

Possible changes in the population of American youth and the problems with the inflated ASVAB score scale provided the impetus to develop a new ASVAB score scale. In 1980, manpower and personnel managers in the Department of Defense (DOD) initiated a massive effort to administer the ASVAB to a nationally representative sample of American youth. The effort formed the basis for developing a new reference population and ASVAB score scale.

REFERENCE POPULATION SAMPLE

Form 8A of the ASVAB was administered in the fall of 1980 to a sample of 11,914 males and females aged 16 through 23 years at the time of testing. The sample was weighted to be nationally representative of all American youth in this age range. This total group is called the *ASVAB Reference Population*. The population of potential military recruits was defined to include only those persons of ages 18 through 23, and this group is called the *1980 Youth Population*. Traditionally, the bulk of enlisted recruits has been in the range of 18 through 23 years old. The younger members of the sample, the 16- and 17-year-olds, were used to construct ASVAB norms for the Institutional Testing Program. Test norms were constructed for students in grades 11 and 12 and for students in 2-year colleges.

SPEEDED-TEST ADJUSTMENT

When the ASVAB was administered to the national sample of youth in 1980, special test booklets and answer sheets were used. The design of the testing materials inadvertently lowered the scores on the two speeded tests, Numerical Operations and Coding Speed, compared to the scores obtained by examinees tested with the military versions of the test materials. A study was conducted by the military services to determine how to adjust the speeded-test scores for the 1980 Youth Population to make the scores comparable to those for military examinees.

The mean Numerical Operations score was changed by about 3 raw points; the original mean in the 1980 population was 34.498, and the adjusted mean is 37.236. The adjustment for Coding Speed, however, is small (mean difference of 1.3 points). The 1980 score scale is based on the adjusted Coding Speed and Numerical Operations scores.

THE AFQT AND APTITUDE LEVELS OF THE OLD AND NEW REFERENCE POPULATIONS

The most widely used composite score obtained from the ASVAB is the Armed Forces Qualification Test (AFQT), defined as a measure of general trainability. Since October 1980, the test has been composed of the Word Knowledge, Paragraph Comprehension, Arithmetic Reasoning, and Numerical Operations subtests.[1] The AFQT is used as the first screen to determine mental qualification for enlistment and to help determine eligibility for enlistment bonuses. The AFQT is also used to report the mental ability of recruits to Congress, which uses the AFQT to help control the distribution of mental aptitudes in the services, such as by setting a ceiling on the percentage of recruits with below-average AFQT scores. The AFQT scores of recruits are tracked back to 1950, when the AFQT was first introduced.

Reanalysis of data on the stability of the WWII score scale indicates that scale drift, while probably present, has not been as serious as thought. In particular, an equating of AGCT (the 1944 test on which the WWII Reference

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1. It is expected that the Numerical Operations subtest in the AFQT will be replaced by the Math Knowledge subtest when forms 15, 16, and 17 of the ASVAB (ASVAB 15/16/17) are introduced.

Population was based) and AFQT 7A (the test used operationally from 1960 through 1973, and later as a reference test for ASVAB equating), indicates a high degree of comparability of the scores on the two tests. The equating as of 1980 indicates that scores on the two tests are nearly equivalent up to a percentile score of 50, and that above this range AFQT 7 was somewhat more difficult (figure I). Historical comparisons[1] of the percentages of persons in the lower half of the AFQT score range appear to be unaffected by score drift.
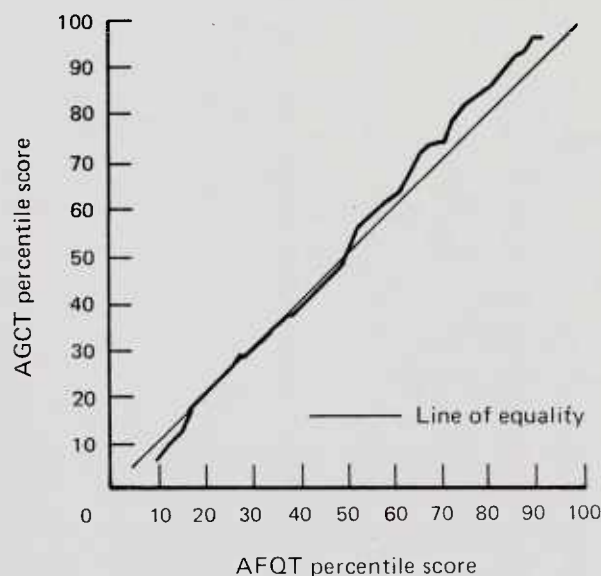
FIG. I: EQUATING AGCT AND AFQT 7 IN SAMPLES OF
MALE HIGH SCHOOL JUNIORS AND SENIORS

AFQT scores are reported as percentile scores, which range from 1 (low) through 99 (high) with 50 as the average or midpoint. For managerial convenience, the AFQT scale is divided into five intervals or score categories:

Category	AFQT percentile score
I	93-99
II	65-92
III	31-64
IV	10-30
V	1-9

1. Assumes that corrected ASVAB 5/6/7 scores are used from the 1976-1980 period.

AFQT scores of the WWII Reference Population and the 1980 Youth Population are shown in table II. The percentages are based on the AFQT. Scores for both groups are expressed on the *same* WWII score scale. The differences indicate how the distribution of ability changed between WWII and 1980. The percentage of males with AFQT scores in the above-average range, especially AFQT category II, appears to have increased by a few percentage points. As discussed in the main text, the comparison is not exact because the AFQT from ASVAB 8/9/10 is not strictly parallel to the tests used during WWII. The general similarity in the ability distributions of the two populations implies that the change to the new, 1980, reference group will not substantially alter the traditional interpretation of score levels.

TABLE II

PERCENTAGE OF WWII AND 1980 POPULATIONS IN AFQT CATEGORIES ON WWII SCORE SCALE

	WWII Population		1980 Youth Population[a]		
AFQT category	Nominal[b]	Actual[c]	Males	Females	Total
I (93-99)	8	7.1	6.5	5.0	5.8
II (65-92)	28	30.0	35.9	33.3	34.6
III (31-64)	34	31.9	28.1	33.4	30.7
IV (10-30)	21	22.9	22.0	22.6	22.3
V (1-9)	9	8.1	7.5	5.7	6.6
I and II (65-99)	36	37.1	42.4	38.3	40.4
I, II, and IIIA (50-99)	51	54.1	55.9	53.5	54.7

NOTE. Changes between the WWII and 1980 populations must be interpreted cautiously. The WWII score scale is especially unreliable around the median. The percentages for the 1980 Youth Population are based on the AFQT as defined in October 1984 (WK + PC + AR + NO/2). The WWII population consists only of males.
a. Ages 18 through 23 years.
b. The column lists the smoothed values traditionally ascribed to the WWII score scale.
c. The column contains the unsmoothed values observed in the WWII population.

CONSTRUCTING THE 1980 SCORE SCALE

The 1980 score scale is based on the distribution of ASVAB scores for the 1980 Youth Population. ASVAB subtest scores are combined to form the AFQT and aptitude composites to help set qualification standards for assigning recruits to occupational specialties. The new score scale for the AFQT is defined by the relationship between AFQT raw scores and percentile scores in the 1980 Youth Population shown in table III.

Air Force aptitude composites are reported as percentile scores, and their computation is the same as for the AFQT. The other services use standard scores for their aptitude composites, which are based on the ASVAB means and standard deviations.

EQUIVALENT ENLISTMENT STANDARDS

During the transition to the 1980 score scale, the services needed to keep the same qualifying standards for enlisting and assigning recruits to occupational specialties as were used in WWII. Job requirements did not change when the 1980 score scale was introduced; only the test scores changed. To permit the services to maintain the same standards, which had been set on the WWII scale, the WWII and 1980 scales were equated. The procedure was to set composite scores attained by the 1980 Youth Population equal to those attained by the same percentage of people in the WWII population.

Equivalent enlistment standards for each service on the WWII and 1980 scales are shown in table IV. The two sets of AFQT scores are almost identical, which reflects the similarity of the AFQT score distribution on the WWII and 1980 scales in AFQT category IV. Supplementary enlistment standards for the Army, Air Force, and Marine Corps are based on aptitude composites (called aptitude indexes by the Air Force). The net effect for enlistment standards is that relatively small changes to the supplementary standards were required to qualify essentially the same people on the two score scales.

The procedures for constructing the AFQT score scale in the 1980 Youth Population and the comparison between the WWII and 1980 AFQT scales are presented in chapter 1. Chapter 2 contains similar information for the military aptitude composites and the Institutional Testing Program composites. The report concludes with a discussion of some implications derived from this study.

TABLE III

CONVERSION OF AFQT[a] RAW SCORES TO PERCENTILE SCORES ON THE 1980 SCORE SCALE

Raw AFQT score	Percentile	Raw AFQT score	Percentile	Raw AFQT score	Percentile	Raw AFQT score	Percentile	Raw AFQT score	Percentile
0.0	1	21.5	1	43.0	11	64.5	30	86.0	67
0.5	1	22.0	1	43.5	11	65.0	30	86.5	68
1.0	1	22.5	1	44.0	11	65.5	31	87.0	69
1.5	1	23.0	1	44.5	12	66.0	32	87.5	70
2.0	1	23.5	1	45.0	12	66.5	32	88.0	71
2.5	1	24.0	2	45.5	12	67.0	33	88.5	72
3.0	1	24.5	2	46.0	13	67.5	34	89.0	73
3.5	1	25.0	2	46.5	13	68.0	35	89.5	74
4.0	1	25.5	2	47.0	13	68.5	35	90.0	75
4.5	1	26.0	2	47.5	14	69.0	36	90.5	76
5.0	1	26.5	2	48.0	14	69.5	37	91.0	77
5.5	1	27.0	2	48.5	14	70.0	38	91.5	78
6.0	1	27.5	3	49.0	15	70.5	38	92.0	79
6.5	1	28.0	3	49.5	15	71.0	39	92.5	80
7.0	1	28.5	3	50.0	16	71.5	40	93.0	81
7.5	1	29.0	3	50.5	16	72.0	41	93.5	82
8.0	1	29.5	3	51.0	16	72.5	42	94.0	83
8.5	1	30.0	4	51.5	17	73.0	42	94.5	84
9.0	1	30.5	4	52.0	17	73.5	43	95.0	85
9.5	1	31.0	4	52.5	17	74.0	44	95.5	86
10.0	1	31.5	4	53.0	18	74.5	45	96.0	87
10.5	1	32.0	4	53.5	18	75.0	46	96.5	88
11.0	1	32.5	5	54.0	19	75.5	46	97.0	89
11.5	1	33.0	5	54.5	19	76.0	47	97.5	90
12.0	1	33.5	5	55.0	20	76.5	48	98.0	91
12.5	1	34.0	5	55.5	20	77.0	49	98.5	92
13.0	1	34.5	6	56.0	21	77.5	49	99.0	93
13.5	1	35.0	6	56.5	21	78.0	50	99.5	94
14.0	1	35.5	6	57.0	22	78.5	51	100.0	94
14.5	1	36.0	6	57.5	22	79.0	52	100.5	95
15.0	1	36.5	6	58.0	23	79.5	53	101.0	96
15.5	1	37.0	7	58.5	23	80.0	54	101.5	97
16.0	1	37.5	7	59.0	24	80.5	55	102.0	98
16.5	1	38.0	7	59.5	24	81.0	56	102.5	98
17.0	1	38.5	8	60.0	25	81.5	57	103.0	99
17.5	1	39.0	8	60.5	25	82.0	58	103.5	99
18.0	1	39.5	8	61.0	26	82.5	59	104.0	99
18.5	1	40.0	8	61.5	26	83.0	60	104.5	99
19.0	1	40.5	9	62.0	27	83.5	62	105.0	99
19.5	1	41.0	9	62.5	27	84.0	63		
20.0	1	41.5	10	63.0	28	84.5	64		
20 5	1	42.0	10	63.5	28	85.0	65		
21.0	1	42.5	10	64.0	29	85.5	66		

SOURCE: Reproduced from table 7 of [13]

a. AFQT defined as WK + PC + AR + NO/2.

TABLE IV

ARMED SERVICES MENTAL ENLISTMENT STANDARDS FOR MALES

Service	ASVAB score	WWII scale[a]		1980 scale[b]	
		Graduate[c]	Nongraduate	Graduate	Non graduate
Army	AFQT	16	31	No change	No change
	Aptitude composite[d]	one 85	two 85s	No change	No change
Navy	AFQT	17	17	No change	No change
	Aptitude composite	None required	None required	No change	No change
Air Force	AFQT	21	65	No change	No change
	Aptitude composite[e]	120	120	133	133
Marine Corps	AFQT	21	31	No change	No change
	Aptitude composite[f]	80	95	No change	No change

a. Standards in effect from 1 October 1980 to 1 October 1984.
b. Standards in effect from 1 October 1984.
c. High school diploma graduate.
d. Graduates need at least one aptitude composite score of 85; nongraduates, at least two scores of 85.
e. Sum of four Air Force composites (Mechanical, Administrative, General, Electronics).
f. Score on General Technical (GT) aptitude composite.

OUTCOMES AND OBSERVATIONS

Outcomes and observations are summarized below.

- The 1980 score scale and test norms were introduced by the Department of Defense on 1 October 1984.

- The ASVAB score scale, used to set standards for selecting and assigning military recruits, is referenced to the 1980 population of 18- through 23-year-old males and females.

- ASVAB test norms for use in the Institutional Testing Program were constructed for nationally representative samples of students in grades 10 through 12 and in 2-year colleges.

- AFQT category boundaries are defined to retain the traditional percentile-score intervals (Category I is 93 through 99; II is 65 through 92; III is 31 through 64; IV is 10 through 30; and V is 1 through 9).

- The Coding Speed and Numerical Operations test scores were adjusted for the effects of the special testing materials used with the ASVAB Reference Population.

- Qualifying standards on the 1980 scale for enlistment and assignment of recruits to occupational specialties were adjusted as required to maintain approximately the same level of expected performance as on the WWII scale.

- The WWII and 1980 populations were very similar in terms of AFQT scores, with the 1980 group having slightly higher scores.

- The WWII score scale appears to have been reasonably stable over time.

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CHAPTER 1

CONSTRUCTING THE 1980 AFQT SCORE SCALE

BACKGROUND

The Armed Services Vocational Aptitude Battery (ASVAB) is used widely throughout the United States for measuring the potential of young people for occupations that require formal training courses or on-the-job training. It is given to about 1 million people each year who apply for enlistment. It is also given each year to about 1 million students in high schools and postsecondary institutions to help them explore careers and make vocational decisions. Congress and military manpower managers use the test to help plan for and manage the enlisted force. The military services use the ASVAB to help select recruits and assign them to occupational specialties in which they have a high likelihood of being satisfactory performers.

The key feature of the ASVAB that permits such widespread use is that the scores can be used to validly predict performance in occupational training programs [1]. Because the ASVAB is a valid measure of potential, it can increase the accuracy of personnel, manpower, and vocational decisions. Although the predictive validity of the ASVAB for civilian occupations has not been documented as well as for military occupational specialties, it should also work in a civilian setting; many civilian occupations and military specialties require the same skills and knowledge. For example, repairing military and civilian trucks or communication equipment involves essentially the same job tasks; therefore, the ASVAB should have predictive validity in both military and civilian cases. For civilians, the ASVAB's predictive validity is useful to guidance counselors who are helping students explore careers. Many military specialties, however, are unique (infantry, for example), and many civilian occupations have no military counterparts (retail sales, for example). In such cases, the ASVAB's usefulness obviously could not be applied to both enlistees and civilian students.

In addition to predictive validity, the usefulness of vocational aptitude tests is enhanced by a stable score scale and representative test norms. A stable score is one that retains its meaning in terms of expected performance regardless of changes in the ability of the people who take the test or of changes in the forms of the tests. With a stable score scale, qualification standards can be set to select people with the appropriate aptitudes, and the

meaning of the standards is retained as long as the predictive validity of the test remains the same. Stated another way, with a stable score scale, qualification standards need to be changed only when job requirements change and not when the recruiting environment or test forms change.

Military selection and classification tests have had a stable scale since World War II (WWII). ASVAB scores, and scores of predecessor tests, were referenced to the scores of a sample of men who entered the military during WWII and took a similar test. This sample is referred to as the *WWII Mobilization,* or *Reference, Population.* This score scale, called the WWII scale, remained in effect until October 1984, when it was replaced by the 1980 score scale described in this report. While the WWII scale was in effect, the meaning of the scores in terms of expected performance remained relatively invariant, as documented by numerous validation studies and supported by the experience of the services in training recruits.

The meaning of the test scores did change, however, in terms of showing the relative standing of examinees in the population of potential recruits. Since WWII, many educational and cultural changes have taken place in this country that were thought to affect the distribution of aptitudes. But in the absence of nationally representative test norms, no one could document the magnitude of the effects. Manpower managers would have preferred that the test norms be based on the current youth population, but they were able to function adequately with the available score distributions.[1]

Personnel and manpower managers in the Department of Defense (DOD) were willing to accept the lack of representative test norms as long as the score scale remained stable in terms of expected performance. The primary concern of the managers was, and remains, that the ASVAB scores continue to be valid predictors of performance so that management decisions will be accurate. From 1976 through 1980, however, events unfolded that shattered confidence in the meaning of the ASVAB scores and led to the construction of a new ASVAB score scale.

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1. For purposes of this discussion, manpower managers make decisions that affect a group of people, such as setting recruiting goals and reenlistment bonuses for specialties that have a shortage of people; personnel managers make decisions that affect individuals, such as establishing procedures to determine whether a person is qualified for enlistment or promotion.

THE PROBLEM

In 1976, forms 5, 6, and 7 (ASVAB 5/6/7) were introduced as the first joint-service test for selecting and classifying enlisted recruits.[1] In 1979 the ASVAB 5/6/7 score scale was found to be seriously inflated compared to the traditional meaning [2, 3]. Because of errors in scaling ASVAB 5/6/7 to the WWII Mobilization Population, many people who were thought to be qualified for enlistment would in fact have been unqualified if ASVAB 5/6/7 had been scaled correctly. During the late 1970s about one-quarter of all recruits were not qualified for enlistment according to the intended standards based on the WWII scale. Although the scaled scores were suspected of being inflated throughout the period when ASVAB 5/6/7 was in use, the extent of the problem was not fully documented until 1979.

In 1980 a new version of the ASVAB, forms 8, 9, and 10 (ASVAB 8/9/10), was introduced. The subtests in ASVAB 8/9/10 are shown in table 1-1. ASVAB 8/9/10 was correctly scaled to the WWII Mobilization Population, and the traditional meaning of the ASVAB scores was restored.

In the turmoil that ensued from documenting the inflation of the ASVAB 5/6/7 scores, DOD manpower managers started probing more deeply into the meaning of the score scale. Many of them were dismayed to find that the ASVAB score scale was still based on the WWII Mobilization Population. They had difficulty comprehending how the scores of a population that existed 35 years earlier could be relevant in the 1970s. When the distinction between a stable score scale, used for setting qualification standards, and test norms, used for interpreting scores relative to the current population of potential recruits, was explained, the managers understood why the ASVAB was still scaled to the WWII population, but they still wanted updated test norms.

The managers decided that they would have the ASVAB administered to the current population of potential recruits. Fortunately, a nationally representative sample of American youth had already been designed for studying the behavior of youth in the labor market. The Department of Labor was the

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1. The ASVAB was introduced in 1968 as the first joint-service test for use in the Student Testing Program. Under this program, the services offer this test free of charge to schools in return for access to the students' test scores and vocational plans. Military recruiters have found that the Student Testing Program is a valuable aid in locating qualified applicants for enlistment.

TABLE 1-1

SUBTESTS IN ASVAB 8/9/10

Subtest		Number of items	Time limit (min)	Description
Title	Symbol			
General Science	GS	25	11	Knowledge of physical and biological sciences
Arithmetic Reasoning	AR	30	36	Understanding how to solve word problems
Word Knowledge[a]	WK	35	11	Knowledge of the meaning of words
Paragraph Comprehension[a]	PC	15	13	Understanding the meaning of paragraphs
Numerical Operations	NO	50	3	A speeded test of simple arithmetic
Coding Speed	CS	84	7	A speeded test of matching words and numbers
Auto/Shop Information	AS	25	11	Knowledge of automobiles and use of tools
Math Knowledge	MK	25	24	Knowledge of algebra, geometry, and fractions
Mechanical Comprehension	MC	25	19	Understanding of mechanical principles
Electronics Information	EI	20	9	Knowledge of electronics

a. The raw scores (number of items correct) for these two subtests are added to form the Verbal (VE) score.

primary sponsor of the study, and DOD helped sponsor it by including a sample of military personnel. The sample is described in the next section of this chapter.

Form 8A of the ASVAB was administered to the nationwide sample in the fall of 1980. The cost of administering, scoring, and conducting preliminary analyses was about $3.5 million. The resulting information has already had a major impact on the DOD testing program. For the first time, nationally representative test norms are available for a vocational aptitude battery.

The WWII Reference Population was not necessarily representative of the male population during the late 1930s and early 1940s. A label appropriately applied to the WWII group of examinees is the "WWII Mobilization Population." During WWII, many men (theology students, for example) received occupational deferments. Other males obviously not qualified for military service, such as those with severe physical handicaps, were not forwarded by draft boards for examination. The sample is called a reference population, even though it is not necessarily representative, because the distribution of aptitude scores obtained during WWII was the basis for scaling military aptitude tests from 1950 until 1984.

The remainder of the report is an exposition of the new ASVAB score scale and test norms constructed from the test administration in 1980 to the nationally representative sample of American youth. The significant outcomes realized through October 1984 are listed at the end of the report. The list will undoubtedly grow as more studies are completed in both the military and civilian communities.

DATA COLLECTION PROCEDURES

Design of the Nationally Representative Sample

In the fall of 1980, form 8A of the ASVAB was administered to a nationally representative sample of 11,914 American youths (table 1-2). The sample had been designed by the National Opinion Research Center (NORC)

to study the behavior of youth in the labor market.[1] The sample represents all American youths born between 1 January 1957 and 31 December 1964 who were not confined to an institution. People temporarily in an institution, such as a hospital, were included. The sample contains a cross-sectional group of 5,766 males and females. Every dwelling in the United States had an approximately equal chance of being selected for the sample; all eligible youths living in the selected dwellings were accepted for the sample.

TABLE 1-2

DESCRIPTION OF THE 1980 NATIONAL
SAMPLE TESTED WITH THE ASVAB

Sample	Unweighted number
Cross-section	
Males	2,822
Females	2,944
Total	5,766
Supplemental[a]	
Hispanic males	668
Hispanic females	695
Black males	1,043
Black females	1,041
White males[b]	697
White females[b]	846
Total	4,990
Military	
Males	738
Females	420
Total	1,158
Totals	
Males	5,968
Females	5,946
Total	11,914

a. The black grouping does not include people classified as Hispanics. The white grouping includes all people not classified as Hispanic or black.
b. Economically disadvantaged.

1. This study is called the National Longitudinal Survey of American Youth. Members of the sample are surveyed periodically to obtain information about their vocational plans and behavior.

A supplemental sample of 4,990 youths in the same age range was included to provide overrepresentation of blacks, Hispanics, and economically disadvantaged whites. An additional sample of 1,158 people in the military services, with overrepresentation of females, was also included. The combined group of 11,914 people was weighted to be representative of the 1980 American youth population born between 1 January 1957 and 31 December 1964. Thirty-six cases were deleted from the sample because of irregular test administrations that invalidated the test scores. The reasons were usually physical handicaps that prevented examinees from reading questions or recording responses; lack of fluency in English, however, did not invalidate the test scores. The sample of 11,914 males and females was weighted to represent 33,555,000 American youth of this age range. The population represented by the final sample of 11,878 cases, with the 36 irregular test administrations excluded, was 32,940,740, which included 16,703,440 males and 16,237,300 females.[1] This sample of 11,878 and the 32,940,740 people it represents is called the *ASVAB Reference Population.*

A panel of sampling experts reviewed and approved the sampling procedures. Because the weighted sample is statistically representative of the nation's youth, it provides a unique basis for determining the distribution of aptitudes in the current population.

Administering the ASVAB

The ASVAB was administered by NORC field workers trained to give the test battery. Each examinee was given an honorarium of $50. Most testing took place at central locations, such as hotels, libraries, or government buildings. Typically, about 10 people were tested at the same time, but about 700 people were tested individually. Details of test administration procedures, including other incentives to encourage participation, are given in [6].

NORC redesigned the ASVAB test booklet and answer sheets prior to administering them. One reason was to delete references to the Department of Defense, and another was to make the answer sheet responses compatible with their scoring equipment. Unfortunately, the redesign increased the time

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1. The sample is described by NORC in a technical report [4] and a nontechnical report [5].

that examinees spent recording their responses. The effects are especially pronounced for the speeded tests: Numerical Operations and Coding Speed. The magnitude of the effects on test scores is presented in a later section on constructing the AFQT score scale.

NORC scored the answer sheets and provided data tapes to DOD. The tapes contained subtest raw scores, weights for individuals to make the sample representative of the population, and background information for each examinee. These data were used by the military services to construct the ASVAB score scale and test norms.

AFQT SCALE AND CATEGORIES

The Armed Forces Qualification Test (AFQT) is the most widely used test score in DOD.[1] It is the first screen to determine qualification for enlistment. It is also used widely to determine eligibility for enlistment bonuses. An AFQT score that figures prominently in making classification decisions is the percentile score of 50, or the median. The services like to maximize the number of recruits with AFQT scores of 50 or better. As a rule, these people are more easily trainable, and they tend to be the pool from which the enlisted career force of noncommissioned officers is drawn.

The AFQT is divided into five score categories or, as they are sometimes called, "mental groups," which managers use when reporting the mental aptitude of recruits to Congress. For some management purposes, however, finer categories are used (table 1-3). The origin of the AFQT categories is described in appendix A.

The AFQT category boundaries have no intrinsic meaning in terms of expected performance in the military, but over the years personnel managers have learned the kinds of performance to expect from people in each category. Because people in category IV are usually more expensive to train, become disciplinary problems more often than those in other categories, and tend to be poor leaders or supervisors, the services try to minimize the percentage of recruits in this category.

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1. The AFQT score is obtained from the ASVAB. In 1984 it was composed of the Arithmetic Reasoning, Word Knowledge, Paragraph Comprehension, and Numerical Operations subtests.

TABLE 1-3

AFQT CATEGORY AND SUBCATEGORY BOUNDARIES

Category	Percentile score boundary
I	93-100
II[a]	65-92
III[b]	31-64
IIIA	50-64
IIIB	31-49
IV	10-30
IVA	21-30
IVB	16-20
IVC	10-15
V	1-9

a. Category II is sometimes divided into IIA (82-92) and IIB (65-81).
b. The Navy divides category III into upper (49-64) and lower (31-48) groups.

The expected performance associated with each category is only a general tendency, and many individuals in each category are exceptions to the rule. Some people in category IV do get promoted to the highest enlisted grades, and many are satisfactory performers. Unfortunately, sometimes the tendency for a general level of expected performance in an AFQT category becomes interpreted as a fixed rule.

CONSTRUCTING THE AFQT SCORE SCALE

Constructing the AFQT score scale in the 1980 Youth Population was computationally simple. The procedure was to obtain the cumulative frequency distribution of AFQT raw scores and convert the raw scores to percentile scores. In practice, however, the procedure was anything but simple. Prior to constructing the score scale, the relevant population had to be defined. Another complication arose because the speeded-test scores for the

ASVAB Reference Population and military examinees were not comparable and had to be adjusted.

Defining the Population

The ASVAB Reference Population consists of people born between 1 January 1957 and 31 December 1964, or ages about 16 through 23 at the time of testing in the fall of 1980. The population eligible for military service, however, tends to be 18 through 23 years of age. Military personnel managers defined the population of potential military recruits, which constitutes the *1980 Youth Population,* to include those people from the ASVAB Reference Population who are 18 through 23 years of age [7].

A related question was whether the ASVAB Reference Population should include both males and females, or only males, as has been historically the case since WWII. Given the growing percentage of females in the enlisted force and changing cultural values, the decision was to include both males and females. Thus, the population of potential military recruits was defined to include 18- through 23-year-old males and females [7].

The younger members of the ASVAB Reference Population, 16- and 17-year-old males and females, were used to construct test norms for the Institutional Testing Program. Some of the older members were also used to construct test norms for students attending 2-year colleges. The Institutional Testing Program is discussed in the next chapter. This program is sometimes also called the Student Testing Program.

Adjusting the Speeded-Test Scores

The adjustment to the speeded tests was completed in early 1984, about 3-1/2 years after the tests were administered. The reason for the delay is that no one suspected a problem with the speeded tests, and awareness of the problem unfolded slowly. Then it took about a year to develop and evaluate plausible hypotheses and to determine the adjustment required to equate scores obtained with military testing materials and those used with the ASVAB Reference Population.

Table 1-4 shows the mean Numerical Operations (NO) and Coding Speed (CS) raw test scores (number of items correct) in the 1980 Youth Population and the estimated scores for the WWII Reference Population. The problem

with the speeded tests was obscured by differences between the two estimated population means for NO in the WWII Mobilization Population: 30.8 for ASVAB 5/6/7 and 36.0 for ASVAB 8/9/10. The unadjusted value for males in the 1980 Youth Population falls about midway between the two values for the WWII Reference Population.

TABLE 1-4

MEAN ASVAB SPEEDED-TEST SCORES

		WWII population		1980 population	
Subtest	Gender	ASVAB 5/6/7	ASVAB 8/9/10	Unadjusted	Adjusted
Numerical Operations	Males	30.8	36.0	33.5	36.3
	Females[a]	–	–	35.5	38.2
Coding Speed	Males	–[b]	43.1	42.9	44.2
	Females[a]	–	–	49.7	51.1

a. No population estimates were available for females in the WWII Reference Population.
b. Coding Speed was not part of ASVAB 5/6/7.

Before the problem was fully understood, two reports were published based on the unadjusted NO and CS scores. One report was the first public presentation of the results [7]. The second constructed an AFQT score scale and equated the WWII and 1980 ASVAB scales [8]. The results in both reports that do not include the NO and CS scores are still valid. But any results in these reports for the AFQT and for aptitude composites that contained the speeded tests are in error. The results in this report supersede those in the earlier reports.

Based in part on the earlier reports [7, 8], DOD personnel managers adopted the 1980 ASVAB score scale. Introduction was scheduled for 1 October 1983. Also scheduled for introduction at the same time were new forms of the ASVAB, forms 11, 12, and 13 (ASVAB 11/12/13).

In the spring of 1983, in preparation for introducing ASVAB 11/12/13, one of the authors was scaling and equating Marine Corps and other service aptitude composites. During this process, he became increasingly aware of the discrepancies in the NO and CS scores. As a result, further analyses were

1-11

conducted [9]. The salient result is depicted in figure 1-1, which shows that males in the 1980 Youth Population consistently scored lower on the speeded tests than males in military samples. The differences existed at all levels of the General aptitude composite.[1] The initial findings about speeded tests [9] are summarized as follows:

- Scores on speeded tests show unacceptable variability from sample to sample:
    - Military examinees score higher than the 1980 Youth Population on speeded tests.
    - Scores that have generous time limits (power tests) do not show a difference in the same samples.
    - Scores on speeded tests increase disproportionally upon retesting.

- This variability is related to testing conditions and not to aptitude mixes in the populations tested.

- Speeded tests inflated the scores of military applicants and recruits on the first version of the 1980 score scale [7, 8]:
    - AFQT by 4 percentile points
    - Clerical/administrative composite by 13 percentile points
    - Other composites by lesser amounts.

The authors recommended that introduction of the 1980 score scale be deferred until the issue of the proper role of speeded tests in the military testing program had been thoroughly examined [9].

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1. The General composite is defined as the sum of Verbal (VE) and Arithmetic Reasoning (AR) subtest scores. It is similar to conventional measures of academic aptitude.

- 1980 military sample (males only)
- × 1980 Youth Population (males only)

Numerical Operations score

50
45
40
35
30
25
20

70   80   90   100   110   120   130

General aptitude composite score
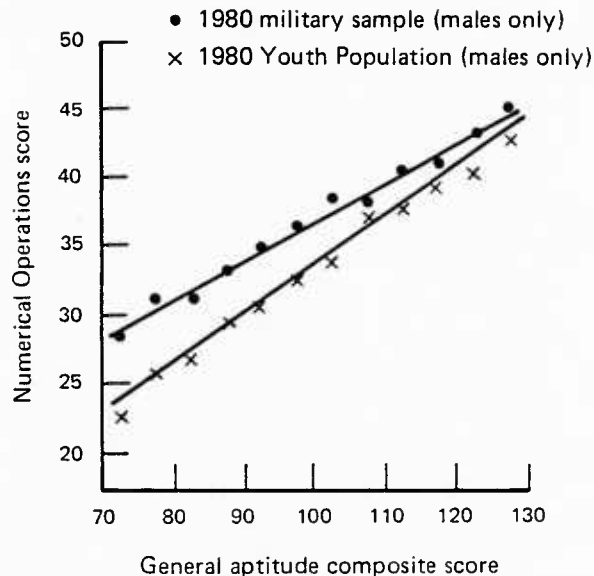
FIG. 1-1: REGRESSION OF NUMERICAL OPERATIONS ON GENERAL APTITUDE COMPOSITE IN THE 1980 YOUTH POPULATION AND IN A MILITARY SAMPLE

The introduction of the 1980 score scale, as well as of ASVAB 11/12/13, was postponed. In the meantime, the service laboratories were attempting to find possible explanations for the difference in scores. The Air Force Human Resources Laboratory (AFHRL) found a likely explanation in the redesigned testing materials used by NORC [10]. The NO portions of the NORC and military answer sheets appear in figure 1-2. They differ in two important respects: the shape of the answer spaces and the layout of the answer sheets. The NORC answer sheet requires examinees to fill in circles, whereas the military answer sheet has slim rectangles. Filling in the circles takes more time. The average examinee completes 12 NO items per minute, so each second is precious. The layout of the NORC answer sheet also compromises time. Whereas the layout of the military answer sheet (seven columns of seven items plus an eighth column of one item) mimics the arrangement of the test booklet (seven problems per column with one problem in the last column), the layout of the NORC answer sheet does not. The isomorphic arrangement of test items in the military test materials should help the examinees keep track of where to record their responses. For the CS test, the same differences between the military and NORC test materials exist, but the average examinee completes only 6 items per minute.

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PART 5 — NUMERICAL OPERATIONS

1 Ⓐ Ⓑ Ⓒ Ⓓ	11 Ⓐ Ⓑ Ⓒ Ⓓ	21 Ⓐ Ⓑ Ⓒ Ⓓ	31 Ⓐ Ⓑ Ⓒ Ⓓ	41 Ⓐ Ⓑ Ⓒ Ⓓ
2 Ⓐ Ⓑ Ⓒ Ⓓ	12 Ⓐ Ⓑ Ⓒ Ⓓ	22 Ⓐ Ⓑ Ⓒ Ⓓ	32 Ⓐ Ⓑ Ⓒ Ⓓ	42 Ⓐ Ⓑ Ⓒ Ⓓ
3 Ⓐ Ⓑ Ⓒ Ⓓ	13 Ⓐ Ⓑ Ⓒ Ⓓ	23 Ⓐ Ⓑ Ⓒ Ⓓ	33 Ⓐ Ⓑ Ⓒ Ⓓ	43 Ⓐ Ⓑ Ⓒ Ⓓ
4 Ⓐ Ⓑ Ⓒ Ⓓ	14 Ⓐ Ⓑ Ⓒ Ⓓ	24 Ⓐ Ⓑ Ⓒ Ⓓ	34 Ⓐ Ⓑ Ⓒ Ⓓ	44 Ⓐ Ⓑ Ⓒ Ⓓ
5 Ⓐ Ⓑ Ⓒ Ⓓ	15 Ⓐ Ⓑ Ⓒ Ⓓ	25 Ⓐ Ⓑ Ⓒ Ⓓ	35 Ⓐ Ⓑ Ⓒ Ⓓ	45 Ⓐ Ⓑ Ⓒ Ⓓ
6 Ⓐ Ⓑ Ⓒ Ⓓ	16 Ⓐ Ⓑ Ⓒ Ⓓ	26 Ⓐ Ⓑ Ⓒ Ⓓ	36 Ⓐ Ⓑ Ⓒ Ⓓ	46 Ⓐ Ⓑ Ⓒ Ⓓ
7 Ⓐ Ⓑ Ⓒ Ⓓ	17 Ⓐ Ⓑ Ⓒ Ⓓ	27 Ⓐ Ⓑ Ⓒ Ⓓ	37 Ⓐ Ⓑ Ⓒ Ⓓ	47 Ⓐ Ⓑ Ⓒ Ⓓ
8 Ⓐ Ⓑ Ⓒ Ⓓ	18 Ⓐ Ⓑ Ⓒ Ⓓ	28 Ⓐ Ⓑ Ⓒ Ⓓ	38 Ⓐ Ⓑ Ⓒ Ⓓ	48 Ⓐ Ⓑ Ⓒ Ⓓ
9 Ⓐ Ⓑ Ⓒ Ⓓ	19 Ⓐ Ⓑ Ⓒ Ⓓ	29 Ⓐ Ⓑ Ⓒ Ⓓ	39 Ⓐ Ⓑ Ⓒ Ⓓ	49 Ⓐ Ⓑ Ⓒ Ⓓ
10 Ⓐ Ⓑ Ⓒ Ⓓ	20 Ⓐ Ⓑ Ⓒ Ⓓ	30 Ⓐ Ⓑ Ⓒ Ⓓ	40 Ⓐ Ⓑ Ⓒ Ⓓ	50 Ⓐ Ⓑ Ⓒ Ⓓ

ANSWER SPACES FOR MILITARY EXAMINEES

PART 5—NO

1 A B C D	8 A B C D	15 A B C D	22 A B C D	29 A B C D	36 A B C D	43 A B C D	50 A B C D
2 A B C D	9 A B C D	16 A B C D	23 A B C D	30 A B C D	37 A B C D	44 A B C D
3 A B C D	10 A B C D	17 A B C D	24 A B C D	31 A B C D	38 A B C D	45 A B C D
4 A B C D	11 A B C D	18 A B C D	25 A B C D	32 A B C D	39 A B C D	46 A B C D
5 A B C D	12 A B C D	19 A B C D	26 A B C D	33 A B C D	40 A B C D	47 A B C D
6 A B C D	13 A B C D	20 A B C D	27 A B C D	34 A B C D	41 A B C D	48 A B C D
7 A B C D	14 A B C D	21 A B C D	28 A B C D	35 A B C D	42 A B C D	49 A B C D

FIG. 1-2: ANSWER SPACES FOR NUMERICAL OPERATIONS SUBTEST USED WITH THE 1980 YOUTH POPULATION AND MILITARY EXAMINEES

A study was conducted on applicants for enlistment to evaluate the effects of the answer sheets on NO and CS test scores. The AFHRL, as executive agent for research on ASVAB, did the analysis [11]. The differences between groups of military applicants tested with the two versions of the answer sheets agreed almost perfectly with the differences found by CNA between the 1980 Youth Population and military samples [9].

The resulting adjustments to the NO and CS raw scores in the 1980 Youth Population are shown in table 1-5. These adjustments have been incorporated into the 1980 score scale, and all uses for military purposes of the 1980 Youth Population data set should include the adjusted NO and CS scores.[1]

Converting the AFQT Raw Scores to Percentile Scores

The conversion[2] of the AFQT raw scores for ASVAB 8/9/10, defined as WK + PC + AR + NO/2, to percentile scores is shown in table 1-6. Contrary to the WWII scale, AFQT raw scores on the 1980 scale are reported in half-point intervals. The half points arise because the NO raw scores are divided by two. The NO raw scores are divided in half to make the NO standard deviation more comparable to those of other subtests. By using the half-point intervals, every percentile score except 61 occurs in the AFQT scale.[3]

1. It is important to note that the NO and CS raw scores obtained in the military and institutional testing programs should not be adjusted. The adjustment is made only to the raw scores of the 11,914 persons in the NORC sample that make up the ASVAB Reference Population and is required when those scores are used for military purposes. If other groups are compared with the 1980 population and they are tested with the same testing materials as the 1980 population, then scores for the ASVAB Reference Population do not require any adjustment.
2. AFHRL made the conversion, which was based on a smoothed cumulative distribution of raw scores.
3. In subsequent versions of the AFQT, from ASVAB 11/12/13, the percentile score of 61 does occur.

TABLE 1-5

ADJUSTMENT TO NUMERICAL OPERATIONS AND CODING SPEED RAW SCORES IN THE 1980 YOUTH POPULATION

Original score in 1980 Youth Population	Adjusted score Numerical Operations	Adjusted score Coding Speed	Score in 1980 Youth Population	Adjusted score Numerical Operations	Adjusted score Coding Speed
0	0	0	43	46	44
1	0	1	44	47	45
2	1	2	45	48	46
3	2	3	46	49	47
4	4	4	47	49	48
5	5	5	48	50	49
6	6	6	49	50	50
7	8	7	50	50	51
8	9	8	51		53
9	10	9	52		54
10	11	10	53		55
11	12	11	54		56
12	14	12	55		57
13	15	13	56		58
14	16	14	57		59
15	17	15	58		60
16	18	16	59		61
17	19	17	60		62
18	21	18	61		63
19	22	20	62		64
20	23	21	63		65
21	24	22	64		66
22	25	23	65		67
23	26	24	66		68
24	27	25	67		69
25	28	26	68		70
26	29	27	69		71
27	30	28	70		72
28	31	29	71		73
29	33	30	72		74
30	34	31	73		75*
31	35	32	74		76
32	36	33	75		77
33	37	34	76		78
34	38	35	77		79
35	39	36	78		80
36	39	37	79		81
37	40	38	80		82
38	41	39	81		83
39	42	40	82		84
40	43	41	83		84
41	44	42	84		84
42	45	43			

SOURCE: [11].

TABLE 1-6

CONVERSION OF AFQT[a] RAW SCORES TO PERCENTILE SCORES ON THE 1980 SCORE SCALE

Raw AFQT score	Percentile	Raw AFQT score	Percentile	Raw AFQT score	Percentile	Raw AFQT score	Percentile	Raw AFQT score	Percentile
0.0	1	21.5	1	43.0	11	64.5	30	86.0	67
0.5	1	22.0	1	43.5	11	65.0	30	86.5	68
1.0	1	22.5	1	44.0	11	65.5	31	87.0	69
1.5	1	23.0	1	44.5	12	66.0	32	87.5	70
2.0	1	23.5	1	45.0	12	66.5	32	88.0	71
2.5	1	24.0	2	45.5	12	67.0	33	88.5	72
3.0	1	24.5	2	46.0	13	67.5	34	89.0	73
3.5	1	25.0	2	46.5	13	68.0	35	89.5	74
4.0	1	25.5	2	47.0	13	68.5	35	90.0	75
4.5	1	26.0	2	47.5	14	69.0	36	90.5	76
5.0	1	26.5	2	48.0	14	69.5	37	91.0	77
5.5	1	27.0	2	48.5	14	70.0	38	91.5	78
6.0	1	27.5	3	49.0	15	70.5	38	92.0	79
6.5	1	28.0	3	49.5	15	71.0	39	92.5	80
7.0	1	28.5	3	50.0	16	71.5	40	93.0	81
7.5	1	29.0	3	50.5	16	72.0	41	93.5	82
8.0	1	29.5	3	51.0	16	72.5	42	94.0	83
8.5	1	30.0	4	51.5	17	73.0	42	94.5	84
9.0	1	30.5	4	52.0	17	73.5	43	95.0	85
9.5	1	31.0	4	52.5	17	74.0	44	95.5	86
10.0	1	31.5	4	53.0	18	74.5	45	96.0	87
10.5	1	32.0	4	53.5	18	75.0	46	96.5	88
11.0	1	32.5	5	54.0	19	75.5	46	97.0	89
11.5	1	33.0	5	54.5	19	76.0	47	97.5	90
12.0	1	33.5	5	55.0	20	76.5	48	98.0	91
12.5	1	34.0	5	55.5	20	77.0	49	98.5	92
13.0	1	34.5	6	56.0	21	77.5	49	99.0	93
13.5	1	35.0	6	56.5	21	78.0	50	99.5	94
14.0	1	35.5	6	57.0	22	78.5	51	100.0	94
14.5	1	36.0	6	57.5	22	79.0	52	100.5	95
15.0	1	36.5	6	58.0	23	79.5	53	101.0	96
15.5	1	37.0	7	58.5	23	80.0	54	101.5	97
16.0	1	37.5	7	59.0	24	80.5	55	102.0	98
16.5	1	38.0	7	59.5	24	81.0	56	102.5	98
17.0	1	38.5	8	60.0	25	81.5	57	103.0	99
17.5	1	39.0	8	60.5	25	82.0	58	103.5	99
18.0	1	39.5	8	61.0	26	82.5	59	104.0	99
18.5	1	40.0	8	61.5	26	83.0	60	104.5	99
19.0	1	40.5	9	62.0	27	83.5	62	105.0	99
19.5	1	41.0	9	62.5	27	84.0	63		
20.0	1	41.5	10	63.0	28	84.5	64		
20.5	1	42.0	10	63.5	28	85.0	65		
21.0	1	42.5	10	64.0	29	85.5	66		

SOURCE: Reproduced from table 7 of [13].
a. AFQT defined as WK + PC + AR + NO/2.

1-17

COMPARING THE WWII AND 1980 POPULATIONS ON AFQT

The conversion of AFQT raw scores for ASVAB 8/9/10 to percentile scores on both the WWII and 1980 scales is shown in figure 1-3. Form 8A of the ASVAB was administered to the 1980 Youth Population and had previously been scaled to the WWII Reference Population. It is a unique bridge for comparing the two populations. The 1980 population of males tends to score higher than the WWII Reference Population on the AFQT except at the top of the scale. However, ASVAB 8 on the WWII scale is not highly reliable in that range, and the differences there need to be interpreted cautiously. Other cautions about comparing the WWII and 1980 populations based on the AFQT distributions are discussed later in this section. In general the aptitude levels of the two populations appear to be similar.
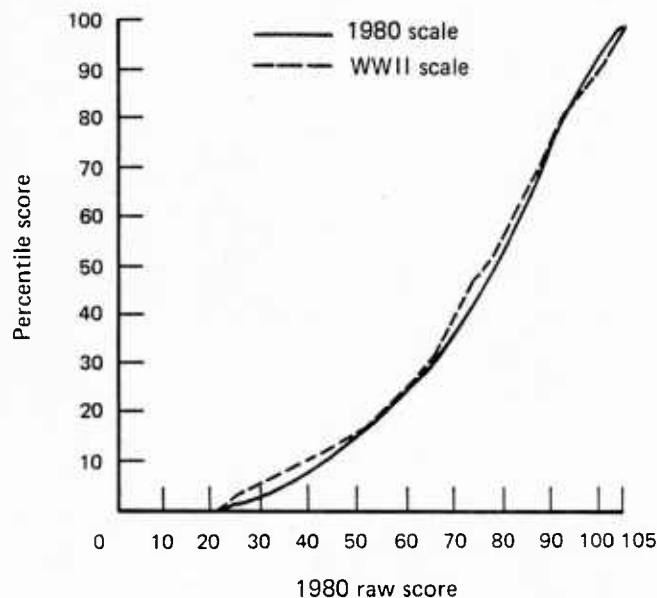
FIG. 1-3: CONVERSION OF AFQT RAW SCORES FROM ASVAB 8A TO PERCENTILE SCORES ON THE WORLD WAR II AND 1980 SCALES

The AFQT distributions for the WWII population, composed of only males, and the 1980 Youth Population (males, females, and total) are summarized in table 1-7. The AFQT distribution for the WWII Reference Population is estimated through the original scaling of ASVAB 8 in 1980 [12]. In that analysis both ASVAB 8 and form 7 of the AFQT, which had been scaled to

the WWII Reference Population, were administered to representative military samples in early 1980. Through equipercentile equating, the ASVAB 8 test scores were placed on the WWII score scale. Thus, the comparison of the 1980 and WWII populations depends on the stability of the WWII score scale from 1944 through 1980. Further analyses underlying a comparison of the WWII and 1980 populations are presented in chapter 3.

TABLE 1-7

AFQT DISTRIBUTIONS IN THE WWII AND 1980 POPULATIONS

| AFQT category | Percentile score boundaries | Percentage in category[a] | | | | |
| | | WWII population[b] | | 1980 Youth Population | | |
		Nominal	Actual	Males	Females	Total
I	93-100	8	7.1	6.5	5.0	5.8
II	65-92	28	30.0	35.9	33.3	34.6
III	31-64	34	31.9	28.1	33.4	30.7
IV	10-30	21	22.9	22.0	22.6	22.3
V	1-9	9	8.1	7.5	5.7	6.6
I-IIIA	50-100	51	54.1	55.9	53.5	54.7

a. WWII AFQT score scale. AFQT is defined as WK + PC + AR + NO/2.
b. The WWII population contains only males. The nominal column lists the smoothed values traditionally ascribed to the WWII score scale. The actual column contains the unsmoothed values observed in the WWII population. Chapter 3 discusses the actual values and precautions for comparing the percentages in each AFQT category

Males in the 1980 Youth Population have higher AFQT scores than were estimated for the WWII population. Although about the same percentage falls in the lower AFQT categories (V and IV), significantly more of the 1980 males score in category II (35.9 versus 28 percent); the percentage of the 1980 male population in the top two categories is 42.4 percent, versus 36 percent of the WWII population, an increase of 6.4 percentage points. Females in the 1980 population score at about the same overall level as males, but as usual, they are more concentrated around the median, with fewer in the extreme categories.

The AFQT scores indicate that the direction of change between WWII and 1980 is up, but the degree of change is difficult to ascertain. One reason is that the WWII Reference Population consists of only those males who entered

the armed forces between 1941 and 1944. There is no exact counterpart population available in the 1980s. Another reason lies in the technical complexity of trying to maintain a stable score scale for 30 years in an operational testing environment. Over the years, the primary concern of the DOD testing community has been to maintain a valid and efficient testing program; the precise stability of the score scale was of lesser concern. The remainder of this chapter points out some necessary precautions for comparing the two populations based on the AFQT score distributions.

The history of tests used during WWII and the various AFQT forms used since 1950 are summarized in table 1-8. Construction of the original AFQT score scale is described in [14]. The military testing program since WWII is reviewed in appendix A.

TABLE 1-8

CONTENT AND HISTORY OF THE AGCT AND THE AFQT

Test	Form	Dates used	Content
Army General Classification Test (AGCT)	1, 2	1941-1945[a]	Verbal, Arithmetic Reasoning, Spatial Relationships
Armed Forces Qualification Test (AFQT)	1, 2	1950-1952	Verbal, Arithmetic Reasoning, Spatial Relationships
	3, 4	1953-1955	Verbal, Arithmetic Reasoning, Spatial Relationships, Tool Knowledge
	5, 6	1956-1959	
	7, 8	1960-1973	
ASVAB-AFQT	5, 6, 7	1976-1980	Verbal, Arithmetic Reasoning, Spatial Relationships
	8, 9, 10 11, 12, 13, 14	1980-	Verbal, Arithmetic-Reasoning, Numerical Operations

a. AGCT is still used by the Marine Corps as an in-service test for officers.

During WWII, the Army General Classification Test (AGCT) was administered to Army, Army Air Force, and Marine Corps recruits. The first AFQT was introduced on 1 January 1950. Only the first forms of the AFQT, used from 1950 until 1953, were parallel to the AGCT (VE + AR + Spatial Relationships). Forms 3 through 8 of the AFQT, used from 1953 to 1973, contained an additional item test, Tool Knowledge, which was an identification test of pictures of tools. The Tool Knowledge items were added to reduce the correlation between AFQT and years of education. These items were dropped from the AFQT in 1973, and the Spatial Relationships items were dropped in 1980. Further details are presented in appendix A.

Forms 1 through 8 of the AFQT, used from 1950 until the early 1970s, were separate tests administered at examining stations to all registrants for the draft and all applicants for enlistment. In 1973, DOD made the use of the AFQT optional, and the services could obtain an AFQT-equivalent score from their aptitude batteries. In 1976, when the ASVAB was introduced for joint-service use to select and classify recruits, an AFQT score was derived from three ASVAB subtests (Word Knowledge, Arithmetic Reasoning, and Spatial Relationships). In 1980, the Paragraph Comprehension and Numerical Operations subtests were added. The AFQT frequently is discussed as though it were still a separate test, but in fact it is an integral part of the ASVAB, and the subtests in the AFQT are also used in the services' aptitude composites (chapter 2).

Even though Tool Knowledge items were deleted from the ASVAB, they continued to play a prominent role in calibrating ASVAB 5/6/7 and ASVAB 8/9/10 to the WWII scale. Both versions of the ASVAB were calibrated to form 7 of the AFQT, used during the Vietnam era, which was composed of Verbal, Arithmetic Reasoning, Spatial Relationships, and Tool Knowledge items.

The trend in the aptitude scores is that they increased between WWII and 1980. As indicated above and further elaborated in chapter 3, the amount of the change is impossible to quantify precisely.

CHAPTER 2

CONSTRUCTING THE APTITUDE COMPOSITE
SCORE SCALES

INTRODUCTION

Aptitude composites are used to assign recruits to occupational specialties and to help determine qualification for enlistment. Each service has a unique set of them. For aptitude composites to fulfill their intended purpose, they must be valid predictors of performance in occupational specialties. The ASVAB and predecessor classification tests do have adequate predictive validity, as documented by hundreds of studies. The aptitude composites can therefore be used confidently to help make personnel classification decisions.

Aptitude composite scores need to have stable meaning in terms of expected performance in occupational specialties. Qualification standards used to determine eligibility of recruits for assignment to occupational specialties should change only as job requirements change. With the introduction of the 1980 score scale, the level of expected performance indicated by the scores of some aptitude composites changed; therefore, adjustments to qualifying standards on the 1980 scale were required to retain the traditional meaning of the aptitude composites.

This chapter describes the variations of the 1980 score scale used by the Institutional Testing Program and by each service in computing and reporting aptitude composite scores. It also describes how the equivalence of aptitude scores on the WWII and 1980 scales was computed.

TYPES OF SCORE SCALES

The four military services use three variations of the 1980 scale for reporting aptitude composite scores (table 2-1). The Air Force uses percentile scores, the same as the AFQT. The Army and Marine Corps use standard scores, allowing all aptitude composites to be placed on the same scale with a mean of 100 and a standard deviation of 20. The Navy does not put its aptitude composites on a common metric. Instead, the scale for each Navy composite is determined by the particular subtests of which it is composed.

The Institutional Testing Program uses both standard and percentile scores (table 2-1). The composites are first placed on a standard score scale, with a mean of 50 and a standard deviation of 10. Then to facilitate interpretation for counseling and guidance, the standard scores are converted to percentile scores.

TABLE 2-1

TYPES OF SCORES USED WITH ASVAB COMPOSITES

ASVAB composite[a]	Type of score	Notes
AFQT	Percentile	Based on sum of subtest raw scores
Composites		
Air Force	Percentile	Based on sum of subtest standard scores
Army	Standard	Based on sum of subtest standard scores[b]
Marine Corps	Standard	Based on sum of subtest standard scores[b]
Navy	Sum of subtest standard scores	No common metric
Institutional Testing Program	Standard and percentile scores	Mean of 50; standard deviation of 10; sum of subtest standard scores converted to percentile scores

a. ASVAB subtests are reported as standard scores with a mean of 50 and a standard deviation of 10.
b. Converted to mean of 100 and standard deviation of 20.

Percentile Scores

Percentile scores are conceptually simple and therefore can be readily understood by most test users. As used by the services, they show the percentage of a population that scores at or below each test score, and the complement shows the percentage that scores above. Percentile scores range from 1 (low) to 99 (high). For example, an AFQT raw score (number of items answered correctly) of 81.5 is converted to a percentile score of 57 (shown earlier in table 1-6). The percentile score of 57 means that 57 percent of the 1980 Youth Population had AFQT raw scores of 81.5 or below, and 43 percent (the complement) had raw scores above 81.5. For convenience, the military

services report percentile scores of 100 as 99. Percentile scores directly indicate how an examinee compares with or ranks within a population.

Percentile scores are computed from cumulative frequency distributions of raw scores. Each percentile score corresponds to 1 percent of the population. This property of percentile scores, that they correspond to percentages of the population, makes them easy to understand by test users. But the conversion from raw score to percentile score is nonlinear, which means that from an analytic point of view they have undesirable mathematical properties.

Standard Scores

Many analysts prefer standard scores because tests on the same scale have equal means and standard deviations. Summary statistics based on standard scores, such as means, standard deviations, and correlations, can therefore be readily interpreted. The formula for computing standard scores is:

$$SS = C + \frac{(X - \overline{X})}{S} D \, ,$$

where

SS = standard score

C = arbitrary mean of standard scores (either 100 or 50 for ASVAB standard scores)

X = raw score

$\overline{X}$ = mean raw score

S = standard deviation of raw scores

D = arbitrary standard deviation of standard scores (either 20 or 10 for ASVAB standard scores).

Because standard scores are linear transformations of raw scores, they retain all the properties of the raw scores (except, of course, mean and standard deviation), such as the shape of the distribution of raw scores.

2-3

The function of standard scores is to put raw scores from several tests on the same metric, with a common mean and standard deviation. The common metric facilitates comparison of examinees with each other.

Standard scores can be directly interpreted in terms of expected performance. Standard scores show how far, in standard-deviation units, an examinee is away from the population mean. The level of expected performance is directly proportional to the distance away from the mean, and the factor of proportionality is the validity coefficient [14]. This interpretation of a validity coefficient is further described in appendix A. For example, a standard score of 110 on the Army and Marine Corps scale is 0.5 standard-deviation units above the mean. The validity coefficient of aptitude composites typically is 0.6. The expected performance of a person with a score of 110, then, is 0.3 standard-deviation units (0.5 × 0.6) above the mean population performance level.

The Institutional Testing Program composites are also reported as standard scores with a mean of 50 and a standard deviation of 10. The standard scores are converted to percentile scores for the population of students in grades 11 and 12 and in 2-year colleges.

CONSTRUCTING APTITUDE COMPOSITE SCORES ON THE 1980 SCORE SCALE

The first step in constructing score scales for aptitude composites is to compute subtest standard scores (SSSs). The mean subtest raw scores and standard deviations in the 1980 Youth Population are shown in table 2-2. Note that the adjusted NO and CS raw scores are used to compute subtest standard scores. The subtest raw scores were converted to standard scores using the formula shown earlier. The SSSs were truncated at three standard deviations away from the mean (20 and 80). Because the ASVAB subtests were relatively easy for the 1980 Youth Population, the scores tended to pile up at the upper end, and the maximum SSS is 72 (for CS). Some subtests did have the standard scores truncated at the low end (GS, NO, and VE).

TABLE 2-2

SUBTEST MEANS AND STANDARD DEVIATIONS[a]
IN THE 1980 YOUTH POPULATION

ASVAB subtest	Symbol	Mean	Standard deviation
General Science	GS	15.950	5.010
Word Knowledge	WK	26.270	7.710
Paragraph Comprehension	PC	11.011	3.355
Verbal[b]	VE	37.281	10.595
Arithmetic Reasoning	AR	18.009	7.373
Math Knowledge	MK	13.578	6.393
Auto/Shop Information	AS	14.317	5.550
Mechanical Comprehension	MC	14.165	5.349
Electronics Information	EI	11.569	4.236
Numerical Operations[c]	NO	37.236	10.800
Coding Speed[c]	CS	47.606	16.763

a. From ASVAB 8A.
b. Verbal is sum of WK and PC raw scores.
c. Mean and standard deviation have been adjusted for use of military testing materials.

Aptitude composite scores are formed by summing the subtest standard scores. All services except the Navy convert these sums to aptitude composite scores. The subtests in each composite are shown in tables 2-3 through 2-6 for the Army, Air Force, Marine Corps, and Navy, respectively [13]. The composites labeled 1980 were introduced on 1 October 1984, when the 1980 score scale and ASVAB 11/12/13 were introduced. For comparison, the titles and definitions of the aptitude composites used prior to 1 October 1984 are also shown. Most composites were not changed, except in the Marine Corps, where the number of composites was reduced from six to four and two of the four were redefined. The Navy reduced the number from 12 to 10 by deleting three and adding one.

The ASVAB subtests in these tables are grouped by similarity of content: GS and VE form a verbal factor; AR and MK a math factor; AS, MC, and EI, a technical factor; and NO and CS, a speed factor. The arrangement can help the reader compare the subtests in the aptitude composites.

TABLE 2-3

ARMY APTITUDE COMPOSITES

Aptitude composite	Scale	ASVAB subtests[a]								
		GS	VE	AR	MK	AS	MC	EI	NO	CS
General Technical	1980 WWII[b]		VE	AR						
General Maintenance	1980 WWII[b]	GS			MK	AS		EI		
Electronics Repair	1980 WWII[b]	GS		AR	MK			EI		
Clerical	1980 WWII		VE VE	AR	MK				NO	CS
Mechanical Maintenance	1980 WWII[b]					AS	MC	EI	NO	
Surveillance/ Communications	1980 WWII		VE VE	AR		AS AS	MC		NO	CS
Combat	1980 WWII[b]			AR		AS	MC			CS
Field Artillery	1980 WWII[b]			AR	MK		MC			CS
Operations/Food	1980 WWII[b]		VE			AS	MC		NO	
Skilled/Technical	1980 WWII[b]	GS	VE		MK		MC			

a. See table 2-2 for titles of subtests.
b. The same subtests were used in the 1980 and WWII scales.

TABLE 2-4

AIR FORCE APTITUDE COMPOSITES

Aptitude composite	Scale	ASVAB subtests[a]								
		GS	VE	AR	MK	AS	MC	EI	NO	CS
Mechanical	1980 WWII[b]	GS				2AS	MC			
Administrative	1980 WWII[b]		VE						NO	CS
General	1980 WWII[b]		VE	AR						
Electronics	1980 WWII[b]	GS		AR	MK			EI		

a. See table 2-2 for titles of subtests.
b. The same subtests were used in the 1980 and WWII scales.

TABLE 2-5

MARINE CORPS APTITUDE COMPOSITES

Aptitude composite	Scale	ASVAB subtests[a]								
		GS	VE	AR	MK	AS	MC	EI	NO	CS
Mechanical Maintenance	1980 WWII[b]			AR		AS	MC	EI		
Clerical	1980		VE		MK					CS
	WWII		VE						NO	CS
Electronics Repair	1980 WWII[b]	GS		AR	MK			EI		
General Technical	1980		VE	AR			MC			
	WWII		VE	AR						
Combat	1980[c]									
	WWII		VE			AS			NO	
Field Artillery	1980[c]									
	WWII		VE	AR		AS				

a. See table 2-2 for titles of subtests.
b. The same subtests were used in the 1980 and WWII scales.
c. Deleted.

TABLE 2-6

NAVY APTITUDE COMPOSITES

Aptitude composite	Scale	ASVAB subtests[a]								
		GS	VE	AR	MK	AS	MC	EI	NO	CS
General Technical	1980 WWII[b]		VE	AR						
Mechanical	1980 WWII[b]		VE			AS	MC			
Electronics	1980 WWII[b]	GS		AR	MK			EI		
Clerical	1980 WWII[b]		VE						NO	CS
Basic Electricity and Electronics	1980 WWII[b]	GS		AR	2MK					
Boiler Technician, Engineman, Machinist's Mate	1980 WWII[b]				MK	AS				
Cryptologic Technician (Interpretive)	1980 WWII[b]		VE	AR					NO	CS
Hospitalman	1980 WWII[b]	GS	VE		MK					
Machinery Repairman	1980 WWII[c]			AR		AS	MC			
Submarine	1980 WWII[b]		VE	AR			MC			
Aviation Structural Mechanic	1980[d] WWII		VE				MC			
Torpedoman	1980[d] WWII			AR			MC			
Nuclear Field	1980[d] WWII	GS			MK			EI		

a. See table 2-2 for titles of subtests.
b. The same subtests were used in the 1980 and WWII scales.
c. None.
d. Deleted.

The composites used in the Institutional Testing Program are shown in table 2-7.[1] These composites were introduced with form 14 of the ASVAB (ASVAB 14) on 1 July 1984.[2] No definitions of previous composites for the Institutional Testing Program are shown because no occupational composites were computed for the previous version (form 5 of the ASVAB). The academic composites in the previous version were similar to those in ASVAB 14.

TABLE 2-7

COMPOSITES USED IN THE INSTITUTIONAL TESTING PROGRAM

Composite	ASVAB subtests[a]								
	GS	VE	AR	MK	AS	MC	EI	NO	CS
Occupational									
Mechanical & Crafts			AR		AS	MC	EI		
Business & Clerical		VE		MK					CS
Electronics & Electrical	GS		AR	MK			EI		
Health, Social, & Technology		VE	AR			MC			
Academic									
Verbal	GS	VE							
Math			AR	MK					
Academic Ability		VE	AR						

a. See table 2-2 for full titles of subtests.
b. The WK and PC standard scores, rather than raw scores, are summed to compute the verbal composite.

Tables for converting SSSs to percentile scores are shown in appendix B for the Air Force and Institutional Testing Program composites. The Army and Marine Corps aptitude composites are reported as standard scores; the computing formulas are shown in table 2-8. Their composites are truncated at 40 and 160, three standard deviations from the mean. Because the Navy uses the SSSs directly, no conversion tables for its composites are shown.

1. Although the Verbal academic composite is shown as VE + GS, the computation actually is the sum of WK + PC + GS standard scores. All other composites use the VE standard score. AFQT also includes WK and PC as separate subtests.
2. Form 14 is identical to form 9A which is considered to be the raw-score parallel to form 8. Therefore, the scores on ASVAB 8A in the new reference population are directly applicable to ASVAB 14.

For the Institutional Testing Program composites, only the formulas for computing composite standard scores (mean of 50 and standard deviation of 10) are shown in table 2-9. The conversion from composite standard scores to percentile scores in student populations are shown in appendix B. Norms were prepared by AFHRL for the population of students in grades 11 and 12 and 2-year colleges; for each grade, percentile scores are reported for each gender and for the total. A recent analysis extended the norms to include grade 10 [15].

TABLE 2-8

VALUES FOR COMPUTING ARMY AND MARINE CORPS
APTITUDE COMPOSITES

Aptitude composite		Sum of subtest standard scores	
Title	Symbol	Mean	Standard deviation
Army aptitude composites[a]			
Combat	CO	199.921	31.789
Field Artillery	FA	199.956	33.160
Electronics Repair	EL	199.845	35.360
Operators/Food	OF	199.976	32.245
Surveillance/Communication	SC	199.900	34.045
Mechanical Maintenance	MM	199.986	32.780
General Maintenance	GM	199.852	34.178
Clerical	CL	149.932	27.292
Skilled Technical	ST	199.873	34.829
General Technical	GT	99.926	18.527
Marine Corps aptitude composites[b]			
Mechanical Maintenance	MM	199.909	34.992
Clerical	CL	149.951	25.575
Electronics Repair	EL	199.844	35.359
General Technical	GT	149.928	26.468

a. See table 2-3 for definition of Army composites.
b. See table 2-5 for definition of Marine Corps composites.

EQUATING THE WWII AND 1980 SCALES

As previously mentioned, the purpose of equating the WWII and 1980 scales was to maintain the same meaning of aptitude scores in terms of expected performance. The services have attempted to control failure rates in

occupational-specialty training courses by adjusting qualifying scores on aptitude composites. Their objective has been to keep failure rates below a specified level. Because training requirements did not change on 1 October 1984, when the 1980 scale was introduced, qualifying standards also should have remained approximately the same. The way to maintain stable standards was to find scores on the 1980 scale that were equivalent to qualifying scores on the WWII scale.

TABLE 2-9

FORMULAS FOR COMPUTING COMPOSITES USED IN
THE INSTITUTIONAL TESTING PROGRAM

Composite	Mean	Standard deviation	Formula[a]
Occupational			
Mechanical and Crafts	199.909	34.992	$.2858\ SSS - 7.1299$
Business and Clerical	149.951	25.575	$.3910\ SSS - 8.6319$
Electronics and Electrical	199.844	35.359	$.2828\ SSS - 6.5186$
Health, Social, and Technology	149.928	26.468	$.3778\ SSS - 6.6450$
Academic			
Verbal	149.919	27.555	$.3629\ SSS - 4.4072$
Math	99.970	19.115	$.5231\ SSS - 2.2992$
Academic Ability	99.926	18.527	$.5398\ SSS - 3.9353$

a. Simplified from $(10*(SSS - M)/SD) + 50$.

The procedure for equating the two scales was to set composite scores attained by the 1980 Youth Population equal to those attained by the same percentage of people in the WWII population. The cumulative frequency distribution of SSSs of each aptitude composite on both the WWII and 1980 scales was computed for the 1980 Youth Population. SSSs from the two scales that have the same cumulative frequency in the 1980 Youth Population are equivalent to each other. The equating procedure is illustrated in figure 2-1 for the Marine Corps Mechanical Maintenance (MM) aptitude composite. The SSS of 184 on the WWII scale and 191 on the 1980 scale both have a cumulative percentage of 42.8 in the 1980 Youth Population, and they therefore are equivalent. The SSS of 184 is converted to a composite score of 90 on the WWII scale and the SSS of 191 to 95 on the 1980 scale. Therefore, an

MM composite standard score of 90 on the WWII scale is equivalent to 95 on the 1980 scale.
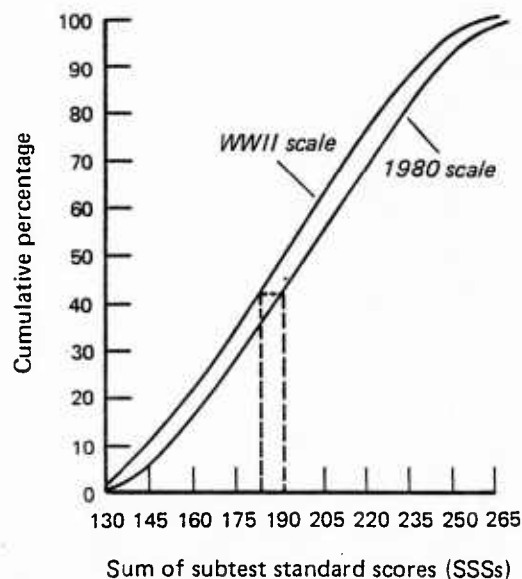
FIG. 2-1: EQUATING THE MARINE CORPS MECHANICAL MAINTENANCE APTITUDE COMPOSITE ON THE WWII AND 1980 SCORE SCALES

The SSS frequencies in the 1980 Youth Population were smoothed before computing the cumulative frequency distributions. Smoothing was accomplished via 3-point moving averages, with the points weighted 0.25, 0.50, and 0.25. Because of the large sample size, the smoothing had little effect on the equating.·

The equating of the scales is exact when the aptitude composites contain the same subtests on both scales. For composites that were redefined on 1 October 1984, the equating is approximate. The redefinitions, however, were relatively minor, and the people are classified in essentially the same way on both scales.

Results of the equatings are summarized in tables 2-10 for the Army, 2-11 for the Air Force, and 2-12 for the Marine Corps. No summary is given here for the Navy because the qualifying scores are unique for each composite.

TABLE 2-10

**EQUIVALENT ARMY APTITUDE COMPOSITE SCORES ON
THE WWII AND 1980 SCALES**

Score on WWII scale	Equivalent score on 1980 scale									
	GT	GM	EL	CL	MM	SC	CO	FA	OF	ST
80	81	84	83	81	87	81	84	81	86	83
85	86	89	87	85	92	85	89	85	91	87
90	90	94	90	88	96	89	93	89	96	91
95	96	99	96	93	102	94	99	94	101	97
100	101	104	100	99	108	100	104	99	107	102
110	110	114	111	108	116	108	114	109	115	111
120	120	124	122	121	126	119	123	121	122	122

GT = General Technical
GM = General Maintenance
EL = Electronics Repair
CL = Clerical
MM = Mechanical Maintenance

SC = Surveillance/Communications
CO = Combat
FA = Field Artillery
OF = Operators/Food
ST = Skilled Technical

TABLE 2-11

**EQUIVALENT AIR FORCE APTITUDE INDEX SCORES ON
THE WWII AND 1980 SCALES**

Score on WWII scale	Equivalent score on 1980 scale			
	Mechanical	Administrative	General	Electronics
30	44	27	30	33
40	57	36	39	43
50	68	45	48	51
60	76	56	59	62
70	82	67	70	72
80	89	77	78	81

TABLE 2-12

**EQUIVALENT MARINE CORPS APTITUDE COMPOSITE
SCORES ON THE WWII AND 1980 SCALES**

Score on WWII scale	Equivalent score on 1980 scale					
	MM	CL	EL	GT	CO	FA
80	86	81	83	80	83	83
85	91	85	87	86	86	89
90	95	89	90	89	92	92
95	101	94	96	95	98	99
100	106	98·	100	100	105	105
105	112	103	106	105	111	111
110	117	107	111	110	116	114
115	121	113	116	115	121	119
120	126	118	122	120	126	123

MM	= Mechanical Maintenance	GT	= General Technical
CL	= Clerical	CO	= Combat; equated to GT
EL	= Electronics Repair	FA	= Field Artillery; equated to GT

ADJUSTMENTS BY SERVICES TO QUALIFYING SCORES

The services adjusted their qualifying standards on the 1980 scale as follows:

- The Army added 5 points to the qualifying standards for specialties that have the General Maintenance, Mechanical Maintenance, or Operators/Food aptitude composites as a prerequisite.

- The Air Force added 15 points to the qualifying standards for the Mechanical composite and subtracted 5 points for the Administrative composite.

- The Marine Corps added 5 points to the qualifying standards on the Mechanical Maintenance composite.

- The Navy changed qualifying scores selectively. Qualifying scores on the Mechanical composite generally were raised by 5 points.

The main effect of the adjustments is that essentially the same people qualify for the occupational specialties under either score scale. In the future, as training and job requirements change, qualifying standards will change accordingly. Changes in training and job requirements affect only a few specialties at a time, and they result in legitimate changes to qualifying standards. Wholesale changes to standards that would have resulted from the introduction of a new score scale are not legitimate, and the adjustments made by the services are appropriate.

CHAPTER 3

EVALUATING CHANGES IN APTITUDE

INTRODUCTION

In the context of this study, the following conditions must be satisfied before aptitude score distributions can be compared confidently:

- The baseline distribution must be empirically sound. In this case, the WWII Reference Population serves as the baseline. Much of this chapter is devoted to examining the appropriateness of this population as the baseline for comparison with the 1980 Youth Population.

- The aptitude tests should measure the same traits. Although the content of the AGCT and the AFQT has changed from time to time, Verbal and Arithmetic Reasoning subtest items have been included in all versions of these tests. These types of items have provided stable test content, and their continued presence allows for evaluation of trends.

- The score scale should have remained stable from the WWII Population to the 1980 Population. The stability of the WWII score scale is also examined in this chapter.

- The populations on which the score distributions are based should be defined in the same way. The definition of the 1980 Youth Population is clear—it consists of the of 18- through 23-year-old males and females in this country in 1980. This population is a sound, empirical basis for comparing score distributions. Other populations that can be compared with the 1980 Youth Population do not have the same precise definition, as is discussed later in this chapter.

AN EXAMINATION OF THE WWII REFERENCE POPULATION

The bulk of the WWII Reference Population is composed of Army and Army Air Force recruits tested with the AGCT at reception centers. Well over

8 million men took the test during WWII. The distribution of AGCT scores, shown by time intervals, is presented in table 3-1. A more complete set of tables showing the AGCT distributions for Army and Army Air Force recruits is in appendix D. The first time period in the table, June 1941 through August 1941, preceded America's entry into WWII. The scores then were higher than those of subsequent periods when the draft was more widespread. In July 1942, the score boundary between categories IV and V was lowered by one-half of a standard deviation. Apparently another change in recording the scores occurred between July and August 1943, when the percentage in category V dropped and the percentage in category IV rose. There was no official change in the category boundaries, however. In August 1943, literacy standards for induction were changed, which might explain part of the abrupt shift. Appendix A defines the AGCT score categories and presents more details about the literacy standards in WWII.

TABLE 3-1

AGCT SCORE DISTRIBUTION DURING WWII

Period	Percentage in same category				
	Category I	Category II	Category III	Category IV[a]	Category V[a]
Jun 1941 – Aug 1941	10.1	30.4	28.4	18.9	12.1
Sep 1941 – Feb 1942	6.9	26.8	31.1	22.6	12.5
May 1942 – Jul 1942[b]	7.3	26.7	30.5	21.1	14.5
Aug 1942 – Jul 1943	5.2	25.3	30.7	29.4	9.4
Aug 1943 – Jul 1944	6.2	28.1	29.9	32.3	3.6
Aug 1944 – Apr 1945	3.9	24.1	32.6	35.9	3.6
Jun 1941 – Apr 1945	5.6	26.0	30.7	29.2	8.4

a. The score boundary between categories IV and V was lowered in July 1942 by one-half of a standard deviation.
b. Scores for March and April 1942 are missing

No one time interval in table 3-1 represents the entire period. Deferment policies based on occupation, education, and other factors changed during the war. Literacy standards changed, as did the policy of testing

illiterates. The score distribution for the entire period, shown in the bottom row of table 3-1, is more representative of the population of young adult males during the early 1940s than it is for any one time period.

STABILITY OF THE WWII SCORE SCALE

Origin of the WWII Scale

Table 3-2 displays the data on which the WWII score scale was based. The proportions in the table are based on input to the services during 1944. The numbers have been adjusted to include people who received direct commissions. The figures shown in table 3-1 include enlisted men who received their commissions *after* being tested with the AGCT; e.g., enlisted men who went through Officer Candidate School are included in table 3-1, but graduates of the military academies are not. The percentages for the total Army and Army Air Force recruits in each AGCT category in table 3-1 agree reasonably well with the Army and Army Air Force proportions computed from table 3-2 (category I = 130 up, category II = 110 through 129), category III = 90 through 109, category IV = 60 through 89, category V = 40 through 59).

The WWII score scale is based on the relationship between the AGCT standard scores (column 1) and the smoothed percentiles (column 7). Reference [14] does not explain why the cumulative frequencies were smoothed as they are. Some implications of the smoothing are discussed at the end of this chapter.

Equating the AGCT and AFQT 7

When the score scale for ASVAB 5/6/7 was found to be inflated in 1979, some analysts argued that it made no difference because the stability of the score scale had been eroding since WWII. To check the stability of the AFQT score scale, the AGCT and form 7 of the AFQT (AFQT 7) were administered in counterbalanced order to a sample of high school students [16]. The results reported in [16] indicate that AGCT and AFQT 7 track closely at the lower end of the score scale but diverge at about the 30th percentile for the rest of the scale. In the sample of high school students, AFQT 7 is more difficult than the AGCT compared with the original scaling of AFQT 7. AFQT 7 was scaled to the AGCT in 1959 on a sample of registrants for induction [17]. Further analysis of the AGCT and AFQT 7 test scores in the sample of high school students was completed for this report.

TABLE 3-2

**PROPORTIONAL DISTRIBUTION OF AGCT STANDARD SCORES FOR
TOTAL STRENGTH OF ARMED FORCES AS OF 31 DECEMBER 1944**

AGCT Standard Score (1)	Army-Air Force (2)	Navy[a] (3)	Marines (4)	Total (5)	Cumulative (6)	Smoothed Percentiles (7)
160 and up	.000020	.001199	.000004	.001223	1.000000	1.00
155-159	.000271	.000636	.000012	.000919	.998777	1.00
150-154	.001449	.001410	.000041	.002900	.997858	1.00
145-149	.002899	.003345	.000086	.006330	.994958	1.00
140-144	.006523	.004466	.000168	.011157	.988628	.99
135-139	.012321	.007640	.000438	.020399	.977471	.98
130-134	.018989	.008186	.000667	.027842	.957072	.96
125-129	.034064	.020319	.001669	.056052	.929230	.92
120-124	.046965	.018632	.002627	.068224	.873178	.87
115-119	.049284	.025002	.003781	.078067	.804954	.80
110-114	.059432	.033328	.004754	.097514	.726887	.73
105-109	.056709	.022608	.005523	.084840	.629373	.63
100-104	.053008	.028291	.003906	.085205	.544533	.55
95-99	.049042	.026565	.004170	.079777	.459328	.47
90-94	.043622	.022821	.003060	.069503	.379551	.37
85-89	.042961	.016189	.002618	.061768	.310048	.30
80-84	.037013	.014347	.001534	.052894	.248280	.26
75-79	.034369	.009598	.001383	.045350	.195386	.20
70-74	.031196	.007355	.000990	.039541	.150036	.15
65-69	.026437	.001989	.000676	.029102	.110495	.12
60-64	.022472	.002838	.000423	.025733	.081398	.09
55-59	.018507	.001894	.000177	.020578	.055660	.06
50-54	.013219	.000555	.000060	.013834	.035082	.04
45-49	.008394	.000353	.000038	.008785	.021248	.02
40-44	.012228	.000171	.000064	.012463	.013463	.02
TOTAL	.681394	.279737	.038869	1.000000		

NOTE: Reproduced from [14].
a. Converted from scores on Navy General Classification Test (NGCT).

In the reanalysis, testing order was found to significantly influence the equality of the AFQT and AGCT score scales (figure 3-1). When AFQT 7 was administered before AGCT, the two scales were essentially equal up to a percentile score of 50. Above that point, AGCT scores were higher. When AGCT was given before AFQT 7, the AGCT scores were higher than the AFQT 7 scores throughout the score range. The detailed score distributions used in the scaling are given in appendix E.
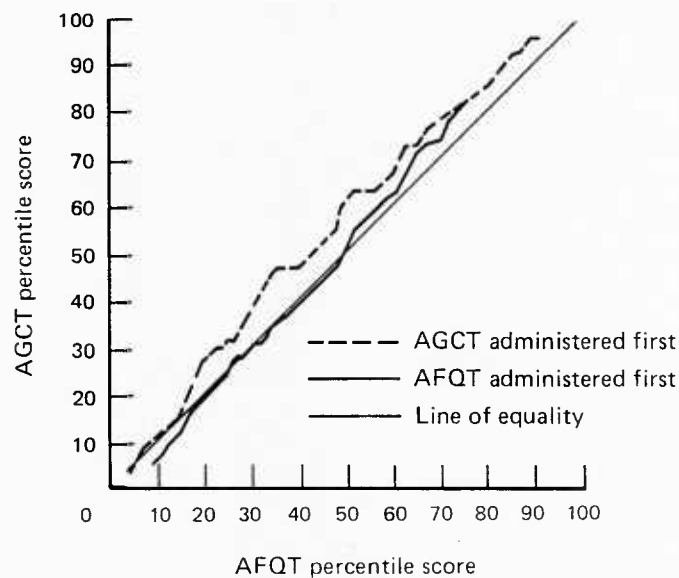
FIG. 3-1: EQUATING AGCT AND AFQT 7 IN SAMPLES OF MALE HIGH SCHOOL JUNIORS AND SENIORS

As shown in figure 3-2, the deviant set of scores is for the AFQT 7 when it is was administered after the AGCT. Because the other three score distributions (AFQT 7 given before AGCT and the AGCT given before or after AFQT 7) are similar, the scaling of AFQT 7 and AGCT based on them is considered more reliable and is used in this report. The deviant distribution (AFQT 7 given after AGCT) has been deleted from the analysis. The discrepant AFQT 7 distribution probably arose because of faulty testing procedures. At this late date, however, there is no feasible way to pinpoint the cause.

Cumulative percentage

AGCT or AFQT 7 percentile scores

Legend:
- AFQT 7 administered first
- AFQT 7 administered second
- AGCT administered first
- AGCT administered second
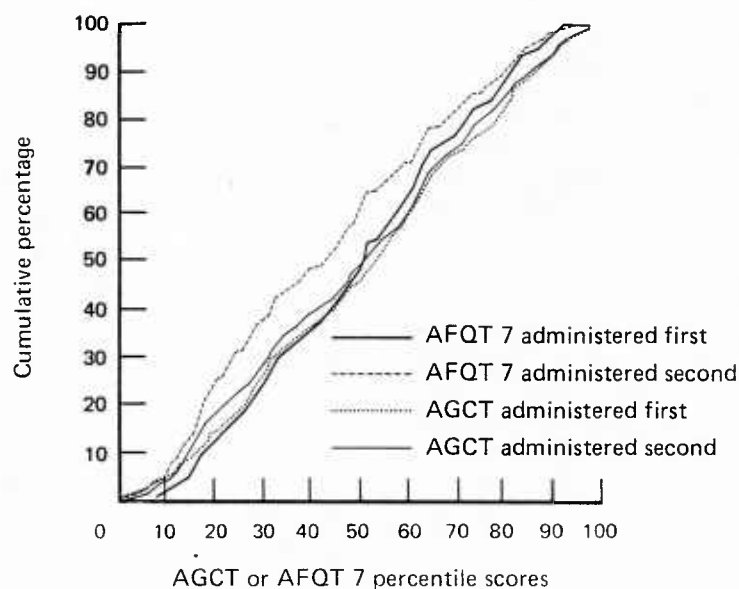
FIG. 3-2: CUMULATIVE DISTRIBUTIONS OF AGCT AND AFQT 7 PERCENTILE SCORES FOR MALE STUDENTS IN GRADES 11 AND 12

COMPARABILITY OF THE WWII AND 1980 POPULATIONS

The WWII Reference Population consisted of males who served in the Armed Forces during WWII. Their ages generally were from 18 to about 25 years, although older men were drafted. No women serving in the Armed Forces during WWII were included in the score distributions.

The 1980 Youth Population consists of males and females of ages 18 through 23 years. Comparisons between the two populations must be based only on males. The ages are close enough to permit comparisons, provided the other conditions have been met.

Evaluating changes in aptitudes between WWII and 1980 appears to be warranted. The WWII Reference Population is reasonably representative of the young adult American males in the early 1940s. And the following tests are reasonably similar: the AGCT (Verbal, Arithmetic Reasoning, and Spatial Relationships items); forms 3 through 8 of the AFQT, used from 1953 until about 1974 (Verbal, Arithmetic Reasoning, Spatial Relationships, and Tool Knowledge items); and the Health, Social, and Technology composite used in the Institutional Testing Program (Verbal, Arithmetic Reasoning, and Mechanical Comprehension subtests). The WWII score scale appears to be reasonably stable. The comparisons should be accurate enough to note trends, but not accurate enough to compute precise amounts of change.

COMPARISON OF APTITUDE SCORE DISTRIBUTIONS IN THE WWII, VIETNAM, AND 1980 PERIODS

Three score distributions are available for groups that reasonably well represent the young adult males in this country. Two distributions for the WWII and 1980 periods have already been discussed at length. The third is for 3,108,573 males who registered for induction from July 1968 through September 1971, called the "Vietnam period." The distribution of AFQT scores for each year of the Vietnam period is shown in appendix E. The three distributions by AFQT category are shown in table 3-3.

TABLE 3-3

PERCENTAGE OF MALES IN AFQT CATEGORIES IN THREE PERIODS

AFQT category	WWII[b]	Vietnam[c]	1980[a]	
			HST[d]	AFQT[e]
I (93-100)	7(8)	8	5	6
II (65-92)	30(28)	33	36	36
III (31-64)	32(34)	34	31	28
IV (10-30)	23(21)	17	22	22
V (1-9)	8(9)	8	6	8

a. Based on the WWII scale.
b. Observed percentage on Army General Classification Test (AGCT) intervals that correspond to AFQT categories; AGCT distribution shown in table 3-2; AGCT contained Verbal, Arithmetic Reasoning and Spatial Relationships; percentage of WWII population in each category on nominal AFQT scale is shown in parentheses.
c. Based on 3,108,573 registrants for induction tested in FYs 1969, 1970, and 1971. The AFQT contained Verbal, Arithmetic Reasoning, Spatial Relationships, and Tool Knowledge items.
d. Health, Social, and Technology composite contained Verbal, Arithmetic Reasoning, and Mechanical Comprehension subtests.
e. AFQT contained Verbal, Arithmetic Reasoning, and Numerical Operations subtests.

The scores for the 1980 males are based on the WWII score scale, the same as for the other groups. Two sets of scores are shown for the 1980 males — HST, because its content is similar to the AGCT, and AFQT, because it is used widely even though the subtests in this version (Verbal, Arithmetic Reasoning, and Numerical Operations) are not as similar to the AGCT and the AFQT used during the Vietnam period.

The scores for the WWII population listed in table 3-3 are based on the actual cumulative distributions, and not the smoothed percentiles, listed in table 3-2. The figures shown in table 3-3 for the WWII and 1980 populations differ slightly from those in table 1-7 because they are based on the cumulative proportions (column 6) and the smoothed percentiles (column 7) of table 3-2. The official WWII score scale, used from 1980 until 1984, was based on the smoothed percentiles of column 7. The net effect of the smoothing when constructing the WWII scale was to increase the percentage in category III (from 32 to 34 percent) and decrease the percentages in categories II (from 30 to 28 percent) and IV (from 23 to 21 percent). Categories I and V were each increased by 1 percent. Another effect of the smoothing was that the percentage of the WWII population that had AGCT scores of 100 or better decreased from 54 percent in the cumulative distribution to 53 percent in the smoothed percentile scores. Note that only 51 percent of the WWII population was said to have AFQT scores of 50 or better according to the official description of the prevalent WWII score scale (table A-8 in appendix A and table 1-7). An AFQT score of 50 and an AGCT score of 100 are comparable on the WWII scale. The smoothing affected the apparent amount of change in aptitude between WWII and later periods. In general, gains in aptitude scores are smaller compared with the actual cumulative WWII distribution than with the official description of the WWII population.

The trend for the percentages in table 3-3 is that aptitude scores increased between WWII and the Vietnam period. The indication is that the percentage in category IV declined (from 23 percent in WWII to 17 percent in the Vietnam period) and that the percentage in category II increased (from 30 percent to 33 percent). Note that the percentages are cited only to draw attention to relevant figures; the quantitative differences are cited only to establish trends and not to be interpreted literally. The decline in below-average scores (category IV) and the increase in above-average scores (category II) indicate that the ability of the male population increased in the 1950s and 1960s.

The aptitude scores appear to have declined between the Vietnam period and 1980. Using the Health, Social, and Technology scores for the 1980 males (on the WWII scale), the percentage in category IV increased (from 17 to 22 percent) and the percentage in combined categories I and II remained constant (41 percent). The increase in category IV came from categories III (decline from 34 to 31 percent) and V (decline from 8 to 6 percent).

The net effect of the changes between WWII and 1980 is that more of the 1980 males scored in the top third of the distribution (categories I and II) compared with the WWII males, and that fewer scored in the bottom third (categories IV and V). About the same percentage scored in the average range (category III).

The decline in aptitude during the 1970s is consistent with the widely heralded decline in academic aptitude tests, notably the Scholastic Aptitude Test (SAT) and the American College Testing Program (ACT). Research on the decline of test scores during the 1970s was reviewed by Waters [18].

CHAPTER 4

DISCUSSION

The 1980 Reference Population solved a problem that has bothered DOD manpower managers since the 1960s. When setting manpower policies, especially during the Vietnam period, managers wanted to know the distribution of aptitudes in the population of potential recruits. Although the available census data provided the numbers of people by age and region, the distribution of aptitudes in the civilian population was still estimated from the WWII Mobilization Population. Because of the vast educational and cultural changes during the 1950s and 1960s, the WWII population was clearly out of date, but no one knew to what extent. The 1980 Youth Population helps manpower managers by providing accurate distributions of aptitudes in the current population of potential recruits. The distributions are available not only for the population as a whole but also for significant social groupings by gender, education, and race/ethnicity. Distributions for other groupings can also be readily obtained from the data.

INTERPRETING THE 1980 SCORE SCALE

The ASVAB score distributions in the 1980 Youth Population tend to be compressed at the top end of the ability continuum, which restricts the ASVAB's usefulness in assessing people who fall into this range. The ASVAB is more useful in assessing people at the lower end of the ability continuum, where the score distributions are more spread out and more accurate discriminations can be made. This emphasis is appropriate because personnel managers need to make decisions on enlisting applicants who fall into the lower ranges.

The score compression at the upper end is most pronounced for the Word Knowledge, Paragraph Comprehension, and Arithmetic Reasoning subtests. Figure 4-1 shows the distribution of the subtest raw scores for Arithmetic Reasoning. The compression of the ASVAB scores implies that the subtest mean scores do not accurately summarize the 1980 Youth Population. If the examinees with high aptitudes could have demonstrated their true level of ability, the mean subtest scores in the 1980 Youth Population and the aptitude composite scores would have been higher than those reported. The median ASVAB subtest scores are more accurate summaries than the means

and are more appropriate for comparing the aptitudes of the WWII and 1980 populations. The distributions of ASVAB subtest scores in the 1980 Youth Population, including the mean and median, are shown in appendix C.
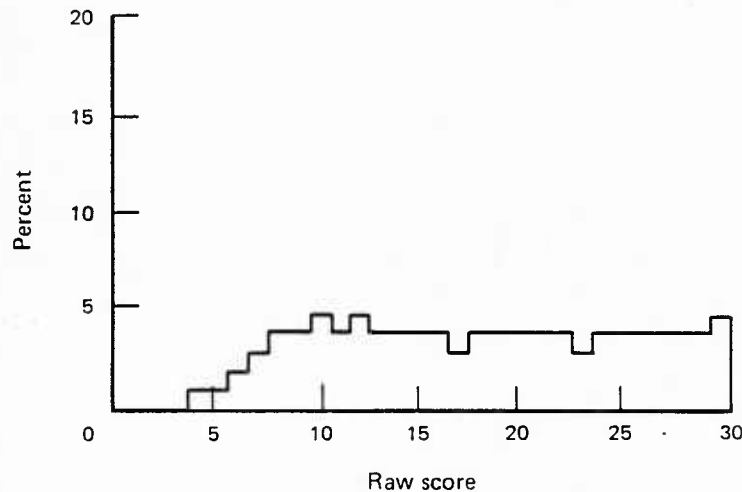
FIG. 4-1: PERCENTAGE OF 1980 YOUTH POPULATION THAT ATTAINED EACH RAW SCORE ON THE ARITHMETIC REASONING SUBTEST

The selection and classification of recruits is not affected by the compression of the ASVAB subtest scores at the top of the scale. Personnel decisions are made at percentile scores of 80 and below or standard scores of 120 and below, and the compression occurs above these points. The compression does, however, affect the way new forms of the ASVAB are scaled to the 1980 score scale. To the extent that new forms of the ASVAB contain more difficult items than did form 8, which was used to construct the 1980 scale, scaling at the upper end will become tougher.

The 1980 score scale is also affected by the large number of easy items in some subtests (General Science, Numerical Operations, and Verbal). When the raw scores for these subtests are converted to subtest standard scores, the score scale is truncated at 20, three standard deviations below the mean. The intercorrelation matrices and standard deviations, therefore, are different for subtest raw scores and standard scores. For military purposes, the subtest standard scores are always used, and the appropriate intercorrelation matrix

for the 1980 Youth Population is the one based on standard scores as shown in table 4-1.[1]

The internal consistency reliability of the subtests, except for the two speeded subtests, NO and CS, is also shown in table 4-1. These values are high—a minimum of .795 for EI, and a maximum of .942 for VE.

The problems encountered with the speeded tests (Numerical Operations and Coding Speed) raise a caveat about comparing the 1980 Reference Population with other groups tested by different testing materials. The speeded-test scores in the 1980 Reference Population were lowered, compared to military examinees, merely because of the way the testing materials were designed. The speeded subtests, and to a lesser extent the other subtests that have generous time limits, are susceptible to change for a variety of reasons, including test format, practice on the test, and the shape of response spaces on the answer sheet. Thus, if a group is to be compared with the 1980 Reference Population on the speeded tests, testing conditions need to be considered in the comparisons.

Even though the ASVAB score distributions have limitations, they fulfill their intended purpose—to construct a score scale that can be used simultaneously to make classification decisions about military recruits and to describe the aptitudes of the population of potential recruits. The 1980 score scale provides DOD personnel and manpower managers with more useful information than has been offered by any of the past scales.

The WWII scale served its primary purpose well—to provide a stable basis for setting aptitude standards for selecting recruits and assigning them to occupational specialties. Even during the 1950s the score scale could not be considered representative of the population of young adult American males; however, it was the only, and therefore the best, basis available. The 1980 score scale provides a unique basis for interpreting scores relative to the population of young adults.

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1. The matrix shown in table 4-1 should be used to correct sample correlation coefficients and standard deviations for range restriction.

TABLE 4-1

RELIABILITY AND INTERCORRELATION[a] OF ASVAB 8 SUBTEST STANDARD SCORES FOR THE 1980 YOUTH POPULATION

	ASVAB subtests[b]												
	GS	AR	WK	PC	NO[c]	CS[c]	AS	MK	MC	EI	VE	Mean	Standard deviation
GS	837[d]	722	801	689	524	452	637	695	695	760	800	49.903	10.013
AR	722	912	708	672	627	515	533	827	684	658	727	49.964	10.013
WK	801	708	927	803	617	550	529	670	593	684	981	49.977	9.964
PC	689	672	803	808	608	561	423	637	521	573	901	50.040	10.039
NO	524	627	617	608	–	701	306	617	408	421	643	50.040	9.976
CS	452	515	550	561	701	–	225	520	336	342	578	49.983	10.014
AS	637	533	529	423	306	225	852	415	741	745	519	49.972	9.996
MK	695	827	670	637	617	520	415	897	600	585	688	50.006	9.988
MC	695	684	593	521	408	336	741	600	835	743	596	50.002	10.043
EI	760	658	684	573	421	342	745	585	743	795	679	49.971	10.000
VE	800	727	981	901	643	578	519	688	596	679	942	49.692	9.927

a. Decimals omitted; these values are to be used for military testing purposes.
b. ASVAB subtests: GS = General Science, AR = Arithmetic Reasoning, WK = Word Knowledge, PC = Paragraph Comprehension, NO = Numerical Operations, CS = Coding Speed, AS = Auto/Shop Information, MK = Math Knowledge, MC = Mechanical Comprehension, EI = Electronics Information, VE = Verbal (WK + PC).
c. Statistics based on adjusted NO and CS scores.
d. Internal consistency (coefficient alpha) reliability; internal consistency for speeded tests (NO and CS) was not computed.

The 1980 score scale does not, of course, guarantee the validity of personnel decisions. People said to be qualified on the ASVAB do not necessarily perform well in their military specialties. The validity of personnel decisions depends on the degree of correlation between the ASVAB scores and meaningful measures of performance. The ASVAB and predecessor military selection and classification batteries have long histories of being valid predictors of performance for the range of specialty training courses. Although less well documented, aptitude tests also have been shown to be valid predictors of job performance, as measured by hands-on job sample tests, disciplinary infractions, and promotion rates. The combination of a meaningful score scale and predictive validity enhances the value of the ASVAB to DOD personnel and manpower managers.

OUTCOMES AND OBSERVATIONS

Outcomes and observations are summarized below.

- The 1980 score scale and test norms were introduced by DOD on 1 October 1984.

- The ASVAB score scale, used to set standards for selecting and assigning military recruits, is referenced to the 1980 population of 18- through 23-year-old males and females.

- ASVAB test norms for use in the Institutional Testing Program were constructed for nationally representative samples of students in grades 10 through 12 and in 2-year colleges.

- AFQT category boundaries are defined to retain the traditional percentile-score intervals (Category I is 93 through 99; II is 65 through 92; III is 31 through 64; IV is 10 through 30; and V is 1 through 9).

- The Coding Speed and Numerical Operations test scores were adjusted for the effects of the special testing materials used with the ASVAB Reference Population.

- Qualifying standards on the 1980 scale for enlistment and assignment of recruits to occupational specialties were adjusted as required to maintain approximately the same level of expected performance as on the WWII scale.

- The WWII and 1980 populations were very similar in terms of AFQT scores, with the 1980 group having slightly higher scores.

- The WWII score scale appears to have been reasonably stable over time.

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APPENDIX A

OUTLINE OF ENLISTED SELECTION AND CLASSIFICATION TESTING SINCE WWII

APPENDIX A

OUTLINE OF ENLISTED SELECTION AND
CLASSIFICATION TESTING SINCE WWII

This appendix describes the content of the military enlisted tests, the different types of score scales used with the ASVAB, and some important ways the tests are used.

CONTENT OF ENLISTED TESTS

Tests used to select and classify enlisted personnel contain certain types of test items because they have demonstrated validity as predictors of success in occupational specialty training. An interservice group was established in the late 1940s to develop the first AFQT. Currently the content of the ASVAB is reviewed and approved by the Joint Services Selection and Classification Working Group, composed of technical and policy representatives from each service and the Office of the Secretary of Defense. As a rule, decisions about the subtests in the battery are supported by the most recent validation data available to the services.

ASVAB 8 Through 17

The subtests in forms 8 through 17 of the ASVAB, with a brief description of each, are shown in table A-1. Two sets of intercorrelations of the ASVAB subtests are shown for the 1980 Youth Population. One set is based on the testing materials used by the National Opinion Research Center when the tests were administered to the examinees in the 1980 Youth Population; subtest raw scores were used to compute these statistics. The intercorrelations for the total population are shown in table A-2; intercorrelations for males and females are shown in tables A-3 and A-4, respectively. The second set is based on the adjusted NO and CS raw scores and on subtest standard scores (with GS, WK, PC, and NO scores truncated at the low end). The intercorrelations for the total population are shown in table A-5; intercorrelations for males and females are shown in tables A-6 and A-7. The second set provides the population values for military testing purposes, such as correcting sample statistics for range restriction.

TABLE A-1

SUBTESTS IN ASVAB 8

Subtest	Number of items	Time limit (min)	Description
General Science	25	11	Knowledge of physical and biological sciences
Arithmetic Reasoning	30	36	Understanding how to solve word problems
Word Knowledge	35	11	Understanding the meaning of words
Paragraph Comprehension	15	13	Understanding the meaning of paragraphs
Numerical Operations	50	3	A speeded test of the four arithmetic operations – addition, subtraction, division, and multiplication
Coding Speed	84	7	A speeded test to match words and numbers
Auto/Shop Information	25	11	Knowledge of automobiles, shop procedures, and tools
Math Knowledge	25	24	Knowledge and skills in algebra, geometry, and fractions
Mechanical Comprehension	25	19	Understanding of mechanical principles, such as gears, levers, pulleys, and hydraulics
Electronics Information	20	9	Knowledge of electricity, radio principles, and electronics

TABLE A-2

**INTERCORRELATION[a] OF ASVAB 8 SUBTEST RAW SCORES
IN THE 1980 YOUTH POPULATION**

| | ASVAB subtests[b] | | | | | | | | | | | | |
	GS	AR	WK	PC	NO[c]	CS[c]	AS	MK	MC	EI	VE	Mean	Standard deviation
GS	–	72	80	69	52	45	64	69	70	76	80	16.0	5.01
AR	72	–	71	67	63	51	53	83	69	66	73	18.0	7.37
WK	80	71	–	80	60	55	53	67	60	68	98	26.3	7.71
PC	69	67	80	–	60	56	42	64	52	57	90	11.0	3.36
NO	52	63	60	60	–	70	30	62	40	41	63	34.5	10.99
CS	45	51	55	56	70	–	22	52	34	34	58	46.3	16.25
AS	64	53	53	42	30	22	–	41	74	75	52	14.3	5.55
MK	69	83	67	64	62	52	41	–	60	59	69	13.6	6.39
MC	70	69	60	52	40	34	74	60	–	74	60	14.2	5.35
EI	76	66	68	57	41	34	75	59	74	–	68	11.6	4.24
VE	80	73	98	90	63	58	52	69	60	68	–	37.3	10.59

a. Decimals omitted.
b. ASVAB subtests: GS = General Science, AR = Arithmetic Reasoning, WK = Word Knowledge, PC = Paragraph Comprehension, NO = Numerical Operations, CS = Coding Speed, AS = Auto/Shop Information, MK = Math Knowledge, MC = Mechanical Comprehension, EI = Electronics Information, VE = Verbal (WK + PC).
c. Statistics based on testing materials used with 1980 Youth Population.

TABLE A-3

INTERCORRELATION[a] OF ASVAB 8 SUBTEST RAW SCORES
FOR MALES IN THE 1980 YOUTH POPULATION

ASVAB subtests[b]

	GS	AR	WK	PC	NO[c]	CS[c]	AS	MK	MC	EI	VE	Mean	Standard deviation
GS	–	74	84	75	57	55	67	72	73	79	84	16.8	5.23
AR	74	–	72	72	68	61	56	83	70	69	75	19.0	7.53
WK	84	72	–	82	62	58	65	68	68	78	98	26.2	7.91
PC	75	72	82	–	60	57	57	67	64	69	91	10.7	3.48
NO	57	68	62	60	–	72	42	66	50	52	64	33.5	11.11
CS	55	61	58	57	72	–	42	60	50	50	60	42.9	15.74
AS	67	56	65	57	42	42	–	43	75	75	66	17.2	5.45
MK	72	83	68	67	66	60	43	–	62	62	71	14.0	6.61
MC	73	70	68	64	50	50	75	62	–	77	70	16.2	5.44
EI	79	69	78	69	52	50	75	62	77	–	78	13.1	4.24
VE	84	75	98	91	64	60	66	71	70	78	–	36.9	10.94

a. Decimals omitted.

b. ASVAB subtests: GS = General Science, AR = Arithmetic Reasoning, WK = Word Knowledge, PC = Paragraph Comprehension, NO = Numerical Operations, CS = Coding Speed, AS = Auto/Shop Information, MK = Math Knowledge, MC = Mechanical Comprehension, EI = Electronics Information, VE = Verbal (WK + PC).

c. Statistics based on testing materials used with 1980 Youth Population.

TABLE A-4

INTERCORRELATION[a] OF ASVAB 8 SUBTEST RAW SCORES FOR FEMALES IN THE 1980 YOUTH POPULATION

	ASVAB subtests[b]											Mean	Standard deviation
	GS	AR	WK	PC	NO[c]	CS[c]	AS	MK	MC	EI	VE		
GS	–	69	79	69	52	47	62	67	63	71	79	15.0	4.60
AR	69	–	71	67	62	51	55	72	68	63	72	17.0	7.06
WK	79	71	–	79	59	54	61	66	60	69	98	26.3	7.49
PC	69	67	79	–	58	54	55	62	56	61	89	11.3	3.19
NO	52	62	59	58	–	68	41	61	46	44	62	35.5	10.76
CS	47	51	54	54	68	–	39	49	42	41	57	49.7	16.05
AS	62	55	61	55	41	39	–	48	58	62	62	11.3	3.80
MK	67	82	66	62	61	49	48	–	63	58	68	13.1	6.13
MC	63	68	60	56	46	42	58	63	–	61	61	12.1	4.37
EI	71	63	69	61	44	41	62	58	61	–	69	10.0	3.62
VE	79	72	98	89	62	57	62	68	61	69	–	37.6	10.22

a. Decimals omitted.

b. ASVAB subtests: GS = General Science, AR = Arithmetic Reasoning, WK = Word Knowledge, PC = Paragraph Comprehension, NO = Numerical Operations, CS = Coding Speed, AS = Auto/Shop Information, MK = Math Knowledge, MC = Mechanical Comprehension, EI = Electronics Information, VE = Verbal (WK + PC).

c. Statistics based on testing materials used with 1980 Youth Population.

TABLE A-5

INTERCORRELATION[a] OF ASVAB 8 SUBTEST STANDARD SCORES
FOR THE 1980 YOUTH POPULATION

| | ASVAB subtests[b] | | | | | | | | | | | | |
	GS	AR	WK	PC	NO[c]	CS[c]	AS	MK	MC	EI	VE	Mean	Standard deviation
GS	–	722	801	689	524	452	637	695	695	760	800	49.903	10.013
AR	722	–	708	672	627	515	533	827	684	658	727	49.964	10.013
WK	801	708	–	803	617	550	529	670	593	684	981	49.977	9.964
PC	689	672	803	–	608	561	423	637	521	573	901	50.040	10.039
NO	524	627	617	608	–	701	306	617	408	421	643	50.040	9.976
CS	452	515	550	561	701	–	225	520	336	342	578	49.983	10.014
AS	637	533	529	423	306	225	–	415	741	745	519	49.972	9.996
MK	695	827	670	637	617	520	415	–	600	585	688	50.006	9.988
MC	695	684	593	521	408	336	741	600	–	743	596	50.002	10.043
EI	760	658	684	573	421	342	745	585	743	–	679	49.971	10.000
VE	800	727	981	901	643	578	519	688	596	679	–	49.692	9.927

a. Decimals omitted; these values are to be used for military testing purposes.
b. ASVAB subtests: GS = General Science, AR = Arithmetic Reasoning, WK = Word Knowledge, PC = Paragraph Comprehension, NO = Numerical Operations, CS = Coding Speed, AS = Auto/Shop Information, MK = Math Knowledge, MC = Mechanical Comprehension, EI = Electronics Information, VE = Verbal (WK + PC).
c. Statistics based on adjusted NO and CS scores.

TABLE A-6

INTERCORRELATION[a] OF ASVAB 8 SUBTEST STANDARD SCORES
FOR MALES IN THE 1980 YOUTH POPULATION

	GS	AR	WK	PC	NO[c]	CS[c]	AS	MK	MC	EI	VE	Mean	Standard deviation
GS	–	736	835	746	577	547	672	716	727	793	841	51.678	10.451
AR	736	–	723	717	681	611	556	831	703	686	751	51.335	10.225
WK	835	723	–	816	632	578	652	683	682	776	982	49.920	10.231
PC	746	717	816	–	615	572	569	670	638	690	908	49.129	10.412
NO	577	681	632	615	–	716	431	653	503	530	655	49.132	10.169
CS	547	611	578	572	716	–	423	604	498	499	601	47.931	9.702
AS	672	556	652	569	431	423	–	433	747	748	653	55.181	9.815
MK	716	831	683	670	653	604	433	–	616	620	706	50.707	10.324
MC	727	703	682	638	503	498	747	616	–	767	696	53.786	10.223
EI	793	686	776	690	530	499	748	620	767	–	781	53.555	10.020
VE	841	751	982	908	655	601	653	706	696	781	–	49.633	10.256

ASVAB subtests[b]

a. Decimals omitted; these values are to be used for military testing purposes.
b. ASVAB subtests: GS = General Science, AR = Arithmetic Reasoning, WK = Word Knowledge, PC = Paragraph Comprehension, NO = Numerical Operations, CS = Coding Speed, AS = Auto/Shop Information, MK = Math Knowledge, MC = Mechanical Comprehension, EI = Electronics Information, VE = Verbal (WK + PC).
c. Statistics based on adjusted NO and CS scores.

TABLE A-7

INTERCORRELATION[a] OF ASVAB 8 SUBTEST STANDARD SCORES
FOR FEMALES IN THE 1980 YOUTH POPULATION

ASVAB subtests[b]

	GS	AR	WK	PC	NO[c]	CS[c]	AS	MK	MC	EI	VE	Mean	Standard deviation
GS	–	691	791	689	523	468	622	668	634	711	795	48.075	9.189
AR	691	–	707	667	611	510	548	822	677	626	725	48.552	9.587
WK	791	707	–	794	605	544	605	659	598	688	981	50.035	9.681
PC	689	667	794	–	593	539	554	621	560	608	895	50.978	9.550
NO	523	611	605	593	–	684	416	599	458	442	629	50.976	9.684
CS	468	510	544	539	684	–	393	488	419	413	568	52.096	9.891
AS	622	548	605	554	416	393	–	478	582	625	617	44.606	6.847
MK	668	822	659	621	599	488	478	–	633	580	676	49.285	9.577
MC	634	677	598	560	458	419	582	633	–	605	612	46.106	8.198
EI	711	626	688	608	442	413	625	580	605	–	694	46.281	8.530
VE	795	725	981	895	629	568	617	676	612	694	–	50.301	9.565

a. Decimals omitted; these values are to be used for military testing purposes.

b. ASVAB subtests: GS = General Science, AR = Arithmetic Reasoning, WK = Word Knowledge, PC = Paragraph Comprehension, NO = Numerical Operations, CS = Coding Speed, AS = Auto/Shop Information, MK = Math Knowledge, MC = Mechanical Comprehension, EI = Electronics Information, VE = Verbal (WK + PC)

c. Statistics based on adjusted NO and CS scores.

The Paragraph Comprehension (PC) subtest was included in ASVAB 8/9/10 to help solve the problem of assessing literacy. In the late 1970s, the services — especially the Army — found that a number of recruits had difficulty reading the instructional materials in their training courses. One solution was to increase the reading or literacy requirements in the Armed Forces Qualification Test (AFQT), used as the first screen in the enlistment process. PC was included as a matter of policy, not because it had unique validity as a predictor of success in the military. Subsequently, research studies have supported PC's predictive validity, and it has a legitimate place in the ASVAB.

The content of military selection and classification batteries, in addition to including the PC, has changed over the years. One notable example is the increased importance of mathematical or quantitative content. The batteries used in the 1970s had a larger quantitative component than previous tests. A test of mathematics knowledge was included in ASVAB 5/6/7, whereas the tests used before the 1970s did not contain a mathematics subtest. The Navy included mathematics items as part of its Electronics Technician Selection Test, but this test was administered only to applicants for highly skilled specialties. Apparently, Math Knowledge became a more effective predictor of performance as military jobs changed or as the civilian education and experience of recruits changed, or both. By the late 1970s, the Math Knowledge subtest generally had the highest validity of the ASVAB subtests as a predictor of success in training courses.

Enlisted Tests During WWII

The Army General Classification Test (AGCT) and Navy General Classification Test (NGCT) were administered to all enlisted accessions during WWII. The AGCT was administered to more than 9 million Army (including the Army Air Force) and Marine Corps recruits during WWII. The NGCT was administered to more than 3 million Navy recruits. The AGCT contained Verbal, Arithmetic Reasoning, and Spatial Relationships items. The NGCT had three types of verbal items (sentence completion, opposites, and verbal analogies). The tests were validated through hundreds of studies.

The WWII general classification tests were supplemented by specialized tests used to help assign recruits to specific skills. In the Army, these tests included Mechanical Aptitude, Clerical Speed, Radio Code, and Automotive Information [A-1]. By spring 1949, the special and general classification tests

the Army used were collected into the Army Classification Battery (ACB). Since then, classification batteries have been used systematically to help direct military recruits into specialties for which they have the highest chance of success and could best meet the needs of their service.

The AFQT

The three types of items in the AGCT (Verbal, Arithmetic Reasoning, and Spatial Relationships) were incorporated into the first AFQT, introduced on 1 January 1950. New forms of the AFQT were introduced on 1 January 1953; these and all subsequent forms (which were used until forms 7 and 8 of the AFQT were withdrawn from operational use in the early 1970s) contained an additional type of item that tests for knowledge of tool functions. Tool Knowledge items had relatively little independent validity, and they were deleted from the AFQT and the classification batteries in the early 1970s. The current version of the ASVAB, forms 8 through 14, contains a few items in the Auto/Shop Information subtest that are similar to the Tool Knowledge items in the AFQT. In subsequent versions, tool or shop items could be expanded upon or deleted, depending on their importance. Validity data will be used to determine how important they are in future versions of the ASVAB.

With the introduction of ASVAB 8/9/10, the content of the AFQT was further modified. The Paragraph Comprehension subtest was added, as was a test of perceptual speed and accuracy — Numerical Operations (NO). NO was added to help reduce cheating on the AFQT because coaching on the speeded items was thought to be difficult. The Spatial Relationships subtest was deleted, in part because it had relatively low predictive validity and in part because females tend to score lower on spatial items than do males. These changes in the AFQT reflect both validity data and policy decisions.

Interest Measures

One of the big issues in military selection and classification tests has been interest, or noncognitive, measures. During the Korean War, the Army developed an interest inventory that was correlated with the performance of foot soldiers in combat. The inventory was incorporated into the ACB in 1958. A new set of interest items was validated during the Vietnam conflict. Items covering interest in other content areas (electronics, mechanical, and clerical/administrative) were added to the Classification Inventory and used

with the ACB introduced in 1973 (ACB-73). Because the interest items had low validity for the other services, they were dropped from ASVAB 8/9/10. Currently the Army uses a noncognitive measure, called the Military Applicant Profile, for the selection process, but no service uses these measures for classifying recruits into occupational specialties. All the services continue to research noncognitive instruments.

Current Research Efforts

This brief review of testing in the military services illustrates the dynamic nature of the program. Research is always being done to improve the quality of the batteries. One current project is to improve the criteria for measuring success in the military. The traditional criterion has been performance in training programs. In recent years, emphasis on developing and using job performance measures as criteria for validating selection and classification decisions has been growing.

A second research effort is to develop a Computerized Adaptive Testing (CAT) system to replace the current format of the ASVAB. CAT would present the items via computer instead of paper-and-pencil method, and it would improve the quality of measurement by presenting items geared to the examinee's level of ability. Precisely how these efforts will reach fruition remains to be determined through the interaction of empirical research and policy decisions.

SCORE SCALES

Score scales for most selection and classification batteries are developed to show relative standing of examinees in a meaningful population. As users gain experience with a battery, the scores acquire meaning as indicators of the level of performance expected from examinees. The population that served as the reference for military selection and classification tests is the WWII Mobilization Population, which included all men then serving in the armed services. The AGCT and NGCT score scales were used to measure the WWII population. Until October 1984 all military tests for enlistees were referenced directly or indirectly to the WWII Mobilization Population.

The AGCT score scale has a mean of 100 and a standard deviation of 20. The scale was divided into five categories, or as they were known, "mental grades." Initially, the mental grades were symmetrical around the mean.

Grade III was one-half of a standard deviation above and below the mean (standard score 90 through 109); grade II was the adjoining standard deviation at the upper end (standard score 110 through 129); grade IV was the adjoining standard deviation at the lower end (standard scores 70 through 89). Grade I was standard scores 130 through 160, the top of the scale, and grade V was standard scores 69 through 40, the bottom of the scale. The boundary between grade IV and V was changed in July 1942 from a standard score of 70 to 60 [A-1].

During WWII the AGCT was used to allocate recruits among Army units. Unit commanders complained when they received too many men in grade V. Initially about 13 percent of recruits were in grade V. After the boundary was lowered to 60, the percentage dropped to about 10 percent, where it remained throughout the war. The initial attempt at symmetry was shortlived; policy considerations soon created a change in the mental grades [A-2].

AFQT Percentile Scores

The distributions of AGCT and NGCT scores were used to construct the scale for the first AFQT, introduced on 1 January 1950. The cumulative distributions for each service and all services combined are shown in appendix D. The AFQT scale is in percentile scores, rather than standard scores.[1] There is a one-to-one correspondence between AFQT percentile scores and AGCT standard scores. The conversion is shown in table A-8.

The AFQT score scale was also divided into five aptitude groups, or as they are now called, "categories." The AFQT category boundaries were based on AGCT mental grades. The correspondence for the initial AFQT categories is as follows [A-3]:

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1. The practice for computing percentile scores in DOD is slightly different from the conventional practices in the psychometric community. Some test practitioners define percentile scores to include only the percentage that scores below a raw score; other practitioners define percentile scores to include all those who score below plus one-half of those who attain the given raw score. In DOD, percentile scores are defined to include all who score below plus all who attain the raw score. In practice, the differences are trivial, and they do not affect the expected performance associated with the percentile score.

TABLE A-8

CONVERSION OF PERCENTILE SCORES TO ARMY STANDARD SCORES

Percentile score	Army standard score	Percentile score	Army standard score	Percentile score	Army standard score
100	155	65	110	30	89
99	147	64	109	29	88
98	141	63	109	28	87
97	137	62	108	27	86
96	135	61	107	26	85
95	133	60	107	25	84
94	131	59	106	24	83
93	130	58	105	23	82
92	128	57	105	22	81
91	127	56	104	21	80
90	126	55	104	20	79
89	125	54	103	19	78
88	124	53	103	18	77
87	123	52	102	17	76
86	123	51	101	16	75
85	122	50	100	15	74
84	121	49	100	14	71
83	121	48	99	13	70
82	120	47	99	12	68
81	119	46	98	11	66
80	118	45	98	10	65
79	118	44	97	9	64
78	117	43	97	8	62
77	117	42	96	7	61
76	116	41	96	6	59
75	116	40	95	5	57
74	115	39	95	4	54
73	114	38	94	3	50
72	114	37	94	2	45
71	113	36	93	1	40
70	113	35	93		
69	112	34	92		
68	112	33	92		
67	111	32	91		
66	111	31	90		

SOURCE: Appendix H of [A-3].

AFQT category	AGCT standard score	AFQT percentile score
I	130-160	93-100
II	110-129	65-92
III	90-109	31-64
IV	70-89	13-30
V	40-69	1-12

On 30 June 1951, Public Law 51, 82nd Congress, became effective. That law established the minimum acceptable standard for induction at a percentile score of 10 or standard score of 65. Consequently, the lower boundary of AFQT category IV was set at 10, where it remained until the scale for the 1980 Youth Population was developed. Since WWII, persons in category V have not been eligible for military service.

The correspondence between AFQT standard scores and percentile scores found in the WWII Mobilization Population could be roughly approximated in the 1980 Youth Population, except at the extremes of the scale. The cumulative frequency distribution of AFQT raw scores from ASVAB 8 for the 1980 Youth Population is in appendix C. The mean AFQT raw score is 73.9 and the standard deviation is 20.8. The standard score scale with a mean of 100 and a standard deviation of 20 in the 1980 Youth Population and the corresponding percentile scores would be as follows:

Standard score	AFQT raw score	Percentile score
60	32.3	5
70	42.7	10
80	53.1	18
90	63.5	28
100	73.9	44
110	84.3	63
120	94.7	84
130	105.1	100
140	–	–

A standard score of 100 would correspond to a percentile score of only 44, instead of 49 or 50 as in the WWII Mobilization Population.

These results show that the distribution of AFQT raw scores is skewed. Because the test items tend to have high pass rates, the raw scores are spread out at the low end of the scale and piled up at the high end. The maximum standard score would be 130 points, or 1-1/2 standard deviations above the mean. The correspondence between standard scores and percentile scores based on the WWII Mobilization Population no longer applies to the 1980 Youth Population.

Aptitude Composite Scores

The services have used their own score scales for aptitude composites. The subtests in each aptitude composite were shown in the main text (tables 2-3 through 2-6). The Army and Marine Corps used the AGCT standard score scale for their composites. Each Army and Marine Corps aptitude composite was referenced to the WWII Mobilization Population through equipercentile equating to the AFQT. The relationship between standard scores and cumulative percentage is shown in table A-8, where the percentile score is also the cumulative percentage in the WWII Mobilization Population. The Navy does not have a common scale for its aptitude composites; each composite has its own mean, standard deviation, and cumulative distribution.

The Air Force uses percentile scores for its aptitude composites. The Air Force started with a stanine score scale. Stanine scores are based on the normal distribution, with the scale divided into nine units, and the width of each unit is one-half of a standard deviation. Until 1984, the Air Force grouped its aptitude composite scores into 20 units of 5 percentile scores each. On 1 October 1984, the Air Force adopted the full range of percentile scores for reporting aptitude composites.

USES OF THE ASVAB

The usefulness of the ASVAB in personnel management is a direct function of its predictive validity. In one form or another, decisions based on the ASVAB involve selection and classification of personnel, either as individuals or as groups. Individuals or groups are qualified to serve because they score higher on the ASVAB, and they are expected to perform better in

the military than those unqualified to serve. Only to the extent that ASVAB scores are related to performance are they useful to personnel managers.

The primary use of the ASVAB is in the selection and classification of enlisted recruits. ASVAB scores are part of enlistment standards and prerequisite scores for assignment to occupational specialty courses. In addition, ASVAB scores have been used to help determine qualification for reenlistment, for admission to Officer Candidate Schools, and for some special assignments. Because ASVAB scores are so important in the careers of enlisted personnel, each service has an extensive retesting program; enlisted personnel can retake the ASVAB to improve their scores, and many do take advantage of the opportunity.

The ASVAB is also used in manpower management. Shortly after its introduction, the AFQT was used during the Korean War to attain an equitable distribution of recruits across all services. The AFQT was also used during the Vietnam era to distribute recruits in category IV across all services. The AFQT has been used to track historically the "quality" of the enlisted accessions as determined by the percentage of recruits in each AFQT category. The percentages are reported to Congress. As already noted, Congress has established that the minimum qualifying score for induction is an AFQT score of 10. In addition, Congress has placed a ceiling on the percentage of recruits who score in category IV.

Enlistment bonuses generally are restricted to persons who score 50 or above on the AFQT. As a rule, recruits who receive a bonus must also attain qualifying aptitude-composite scores.

The validity of the ASVAB for predicting performance in occupational specialty training typically is around .6. The interpretation of the validity coefficient in personnel selection of classification is straightforward. The coefficient is directly proportional to the gain over random selection. Thus, a validity coefficient of .6 is 60 percent of the maximum possible gain in selecting and classifying personnel.

For example, say a military service, or any employee, wants to obtain 500 satisfactory workers in an occupation where 50 percent of the population could be trained to be satisfactory performers (the remaining 50 percent would fail the occupational training course). If the trainees were selected randomly or, as the equivalent, given an aptitude test that has zero validity, then 1,000 people would need to be put through the training course to obtain 500

satisfactory workers. The maximum performance of the 500 workers would be obtained by selecting the 500 graduates, assuming the training is perfectly valid. The mean performance of the 500 graduates, assuming a normal distribution, is .8 of a standard deviation above the population mean.[1]

A selection procedure that results in a failure rate of 50 percent is more costly than most employers care to endure. Many employers use aptitude tests to identify people with sufficient potential to learn how to perform the occupations. If a group of trainees with aptitude scores above the population mean were selected (all in the top 50 percent of the population), then their mean performance would be .48 (.6 × .8) of a standard deviation above the population mean. (The validity of the test is .6, and .8 is the mean of the group selected on the basis of a perfectly valid score.) This interpretation of validity coefficients was formulated by Brogden [A-4].

Society is increasingly concerned about equal employment opportunities for all segments of the population. The ASVAB, as a valid predictor of success in the military, provides an opportunity for all qualified individuals to join the military services. The relatively large number of minority members who join the services indicates that many of them view military services as desirable employers. The ASVAB is an objective and valid basis for selecting the qualified applicants from minority groups. The ASVAB helps ensure that the selection and classification of recruits is accomplished equitably.

The uses of the ASVAB have expanded since WWII. During WWII, AGCT and NGCT were used only for classification and not for selection. However, as evidence mounted on the usefulness of test scores, personnel managers grew more confident in using them for selection purposes. This trend is expected to continue: As the ASVAB grows more refined, personnel managers should find it even more helpful.

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1. In a normal distribution, the mean of a selected group is q/p, where q is the ordinate of the point of selection (p).

REFERENCES

[A-1]   Army Research Institute. "The Army General Classification Test."
        Psychological Bulletin 42, 10, (Dec 1945)

[A-2]   Staff, Personnel Research Section. "The Army General Classification
        Test, With Special Reference to the Construction and Standardization
        of Forms 1a and 1b." *Journal of Educational Psychology* (Nov 1947)

[A-3]   Army Research Institute, Report 976, *Development of Armed Forces
        Qualification Test and Predecessor Army Screening Tests,* 1946-1950,
        by J. E. Uhlaner, Unclassified, Nov 1952

[A-4]   Brogden, H. E. "On the Interpretation of the Correlation Coefficients
        as a Measure of Predictive Efficiency." *Journal of Educational
        Psychology* 37 (1946): 65-76

APPENDIX B

ASVAB CONVERSION FORMULA AND TABLES
FOR THE 1980 REFERENCE POPULATION

APPENDIX B

ASVAB CONVERSION FORMULA AND TABLES FOR THE 1980 REFERENCE POPULATION

This appendix presents the formula and tables for converting ASVAB raw scores on the 1980 score scale. The formulas for computing subtest standard scores are shown in table 2-2 of the main text.

Table 2-8 of the main text shows the formulas for converting the sums of subtest standard scores (SSSs) to aptitude composite standard scores for the Army and Marine Corps. The conversion from subtest raw score to SSS and from SSS to aptitude composite score is linear: $SSS = a + bx$, which is expressed as

$$SSS = \left(50 - \frac{10\,\overline{X}}{S_x}\right) + \left(\frac{10}{S_x}\right)x\,,$$

where:

    50 = arbitrary mean of standard scores

    10 = arbitrary standard deviation of standard scores

    $\overline{X}$ = mean of subtest raw scores

    S_x = standard deviation of subtest raw scores

    x = subtest raw score.

This formula is equivalent to the one presented in the main text but shows the linear relationship more clearly.

For the Army and Marine Corps, the aptitude composite scores have a mean of 100 and a standard deviation of 20. The conversion from SSSs to aptitude composite scores is similar to that for subtest standard scores. The a and b constants, of course, are computed to produce a scale with a mean of 100, rather than 50, and a standard deviation of 20, rather than 10. The Air Force aptitude composite scores are reported as percentile scores. The conversion

from SSSs to aptitude composite percentile scores is shown in table B-1. No conversion table is shown for Navy aptitude composites because the Navy uses the sum of subtest standard scores with no conversion to a common metric.

Table B-2 shows the values for converting SSSs to occupational and academic composite scores for the Institutional Testing Program (defined in table 2-7). Note that the values for the occupational composites are identical to those for the Marine Corps aptitude composites. The composites for the Institutional Testing Program are expressed as standard scores, with a mean of 50 and a standard deviation of 10. The standard scores are converted to percentile scores for males and females in grades 11 and 12, the 1980 Youth Population, and students in 2-year colleges (table B-3).

A recent analysis has extended the norms for the Institutional Testing Program to grade 10.[1] Norms were also produced for grade 9, but a policy decision was made that they would not be implemented. Conversion tables are given in table B-4.

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1. CNA, Report 119, *Using the High School ASVAB in 9th and 10th Grades,* by D.R. Divgi and Gary E. Horne, Unclassified, July 1986.

TABLE B-1

CONVERSION OF U.S. AIR FORCE APTITUDE COMPOSITE SCORES TO 1980 PERCENTILE SCORES

SSS	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	SSS		SSS	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	SSS
40			1		40		80	1	2	18	1	80
41			1		41		81	1	2	19	1	81
42			1		42		82	1	2	20	1	82
43			1		43		83	1	2	21	1	83
44			1		44		84	1	2	22	1	84
45			1		45		85	1	3	23	1	85
46			1		46		86	1	3	25	1	86
47			1		47		87	1	3	26	1	87
48			1		48		88	1	3	27	1	88
49			1		49		89	1	3	29	1	89
50			1		50		90	1	4	30	1	90
51			1		51		91	1	4	32	1	91
52			1		52		92	1	4	33	1	92
53			1		53		93	1	4	34	1	93
54			1		54		94	1	4	36	1	94
55			1		55		95	1	5	37	1	95
56			1		56		96	1	5	39	1	96
57			1		57		97	1	5	41	1	97
58			1		58		98	1	5	42	1	98
59			2		59		99	1	6	44	1	99
60		1	2		60		100	1	6	46	1	100
61		1	3		61		101	1	6	48	1	101
62		1	3		62		102	1	6	50	1	102
63		1	4		63		103	1	7	52	1	103
64		1	4		64		104	1	7	53	1	104
65		1	5		65		105	1	7	55	1	105
66		1	5		66		106	1	8	57	1	106
67		1	6		67		107	1	8	59	1	107
68		1	7		68		108	1	8	62	1	108
69		1	8		69		109	1	9	64	1	109
70		1	9		70		110	1	9	66	1	110
71		1	9		71		111	1	10	68	1	111
72		1	10		72		112	1	10	70	1	112
73		1	11		73		113	1	11	72	1	113
74		1	12		74		114	1	11	74	1	114
75		1	13		75		115	1	11	76	1	115
76		1	14		76		116	1	12	78	1	116
77		1	15		77		117	1	12	80	1	117
78		1	16		78		118	1	13	82	1	118
79		2	17		79		119	1	13	84	1	119

TABLE B-1 (Continued)

SSS	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	SSS
120	1	14	86	1	120
121	1	14	88	1	121
122	1	15	90	1	122
123	1	15	92	1	123
124	1	16	94	1	124
125	1	17	96	1	125
126	1	17	98	1	126
127	1	18	99	1	127
128	1	19	99	1	128
129	2	20	(Thru SSS = 160)	1	129
130	2	20		1	130
131	2	21		1	131
132	2	22		1	132
133	2	23		2	133
134	3	24		2	134
135	3	25		2	135
136	3	26		2	136
137	4	27		3	137
138	4	28		3	138
139	4	29		4	139
140	5	30		4	140
141	5	31		4	141
142	5	32		5	142
143	6	34		5	143
144	6	35		6	144
145	7	36		6	145
146	7	37		7	146
147	8	39		8	147
148	8	40		8	148
149	9	41		9	149
150	9	43		9	150
151	10	45		10	151
152	11	46		11	152
153	11	48		11	153
154	12	50		12	154
155	12	51		13	155
156	13	53		13	156
157	13	54		14	157
158	14	56		14	158
159	15	58		15	159

SSS	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	SSS
160	15	60		16	160
161	16	61		17	161
162	17	63		17	162
163	18	65		18	163
164	18	67		19	164
165	19	68		19	165
166	20	70		20	166
167	21	72		21	167
168	21	74		22	168
169	22	76		22	169
170	23	77		23	170
171	24	79		24	171
172	25	80		25	172
173	26	82		26	173
174	26	83		27	174
175	27	85		28	175
176	28	86		29	176
177	29	87		30	177
178	30	89		31	178
179	31	90		32	179
180	32	92		32	180
181	33	93		33	181
182	34	94		34	182
183	35	95		35	183
184	36	95		36	184
185	37	96		37	185
186	38	97		38	186
187	39	98		39	187
188	40	98		40	188
189	40	99		41	189
190	41	(Thru SSS		42	190
191	42	= 240)		43	191
192	43			43	192
193	44			44	193
194	45			45	194
195	46			46	195
196	47			47	196
197	48			48	197
198	49			49	198
199	50			50	199

SSS	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	SSS	SSS	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	SSS
200	51			50	200	235	81			81	235
201	52			51	201	236	81			81	236
202	53			52	202	237	82			82	237
203	54			53	203	238	83			83	238
204	55			54	204	239	83			84	239
205	56			55	205	240	84			85	240
206	57			56	206	241	85			86	241
207	58			57	207	242	85			86	242
208	59			58	208	243	86			87	243
209	60			59	209	244	87			88	244
210	60			60	210	245	88			88	245
211	61			61	211	246	88			89	246
212	62			62	212	247	89			90	247
213	63			62	213	248	89			90	248
214	64			63	214	249	90			91	249
215	65			64	215	250	91			92	250
216	66			65	216	251	91			92	251
217	67			66	217	252	92			93	252
218	68			67	218	253	92			93	253
219	68			67	219	254	93			94	254
220	69			68	220	255	93			95	255
221	70			69	221	256	94			95	256
222	71			70	222	257	94			96	257
223	72			71	223	258	95			96	258
224	72			72	224	259	96			97	259
225	73			72	225	260	96			97	260
226	74			73	226	261	96			98	261
227	74			74	227	262	97			98	262
228	75			75	228	263	97			98	263
229	76			76	229	264	98			99	264
230	77			77	230	265	98			(Thru SSS	265
231	78			77	231	266	98			= 320)	266
232	78			78	232	267	99				267
233	79			79	233		(Thru SSS				
234	80			80	234		= 320)				

NOTE: Table reproduced from [13].

TABLE B-2

VALUES FOR COMPUTING ARMY AND MARINE CORPS
APTITUDE COMPOSITES

Aptitude composite		Sum of subtest standard scores	
Title	Symbol	Mean	Standard deviation
Army			
Combat	CO	199.921	31.789
Field Artillery	FA	199.956	33.160
Electronics Repair	EL	199.845	35.360
Operators/Food	OF	199.976	32.245
Surveillance/Communication	SC	199.900	34.045
Mechanical Maintenance	MM	199.986	32.780
General Maintenance	GM	199.852	34.178
Clerical	CL	149.932	27.292
Skilled Technical	ST	199.873	34.829
General Technical	GT	99.926	18.527
Marine Corps			
Mechanical Maintenance	MM	199.909	34.992
Clerical	CL	149.951	25.575
Electronics Repair	EL	199.844	35.359
General Technical	GT	149.928	26.468

a. See table 2-3 for definition of Army composites.
b. See table 2-5 for definition of Marine Corps composites.

TABLE B-3

ASVAB 14 (A, B, & C) MECHANICAL & CRAFTS (MC)
COMPOSITE PERCENTILE NORMS BY SEX AND GRADE

Standard Score	Females Grade		Males Grade		Total Grade		Standard Score
	11th	12th	11th	12th	11th	12th	
29 and less	1	1	1	1	1	1	29 and less
30	1	1	1	1	1	1	30
31	1	2	2	1	2	2	31
32	2	4	3	1	3	3	32
33	6	7	6	3	6	5	33
34	9	8	8	4	8	6	34
35	13	12	9	6	11	9	35
36	18	18	11	7	15	12	36
37	25	24	14	9	19	16	37
38	27	25	16	10	22	17	38
39	33	30	20	11	26	20	39
40	37	34	22	13	29	23	40
41	43	39	25	16	34	27	41
42	47	42	28	19	38	31	42
43	53	48	31	22	42	35	43
44	57	55	33	24	45	40	44
45	62	62	38	28	50	45	45
46	66	65	39	30	53	47	46
47	73	69	43	33	58	50	47
48	76	73	46	35	61	54	48
49	82	77	50	39	66	58	49
50	84	80	54	42	69	60	50
51	88	83	59	47	73	64	51
52	89	86	64	50	76	67	52
53	92	90	68	54	80	72	53
54	94	92	70	58	82	74	54
55	95	94	74	62	84	78	55
56	96	95	76	65	86	80	56
57	97	96	81	71	89	83	57
58	98	97	82	74	90	85	58
59	98	98	86	78	92	88	59
60	99	98	89	81	94	89	60
61	99	99	92	86	96	92	61
62	99	99	94	87	97	93	62
63	99	99	96	91	98	95	63
64	99	99	97	93	98	96	64
65	99	99	98	94	99	97	65
66	99	99	99	96	99	98	66
67	99	99	99	98	99	99	67
68 and more	99	99	99	99	99	99	68 and more

Note: MC = Sum of AR + AS + MC + EI Standard Scores reconverted to Standard Scores.

ASVAB 14 (A, B, & C) BUSINESS & CLERICAL (BC)
COMPOSITE PERCENTILE NORMS BY SEX AND GRADE

Standard Score	Females Grade		Males Grade		Total Grade		Standard Score
	11th	12th	11th	12th	11th	12th	
24 and less	1	1	1	1	1	1	24 and less
25	1	1	2	1	1	1	25
26	1	1	3	1	2	1	26
27	1	1	3	2	2	2	27
28	1	1	4	3	3	2	28
29	2	1	6	4	4	2	29
30	3	2	8	5	5	3	30
31	4	2	9	5	6	3	31
32	5	3	11	6	8	5	32
33	6	4	12	7	9	5	33
34	7	5	14	8	11	7	34
35	8	6	15	9	12	8	35
36	9	8	19	11	14	9	36
37	11	9	21	13	16	11	37
38	13	10	26	15	20	12	38
39	16	13	29	17	22	15	39
40	18	14	32	20	25	17	40
41	21	18	35	23	28	21	41
42	24	22	38	25	31	24	42
43	28	25	42	30	35	28	43
44	33	28	44	33	38	30	44
45	37	33	47	38	42	36	45
46	39	35	50	41	45	38	46
47	42	40	54	46	48	43	47
48	48	45	58	49	53	47	48
49	50	48	62	52	56	50	49
50	55	53	65	57	61	55	50
51	59	57	69	62	64	60	51
52	64	62	73	66	68	64	52
53	66	65	75	68	71	67	53
54	69	69	78	72	74	70	54
55	76	74	81	75	78	75	55
56	78	77	83	78	80	77	56
57	82	82	87	82	85	82	57
58	84	85	90	84	87	84	58
59	87	89	93	90	90	89	59
60	89	91	96	93	92	92	60
61	92	93	97	95	95	94	61
62	94	94	98	96	96	95	62
63	98	96	99	98	98	97	63
64	99	98	99	99	99	99	64
65 and more	99	99	99	99	99	99	65 and more

Note: BC = Sum of VE + CS + MK Standard Scores reconverted to Standard Scores.

TABLE B-3

ASVAB 14 (A, B, & C) ELECTRONIC & ELECTRICAL (EE)
COMPOSITE PERCENTILE NORMS BY SEX AND GRADE

Standard Score	Females Grade 11th	Females Grade 12th	Males Grade 11th	Males Grade 12th	Total Grade 11th	Total Grade 12th	Standard Score
29 and less	1	1	1	1	1	1	29 and less
30	1	1	2	1	1	1	30
31	1	2	3	1	2	2	31
32	4	3	4	2	4	2	32
33	6	5	5	3	5	4	33
34	7	9	9	5	8	7	34
35	10	11	11	6	11	9	35
36	14	14	13	8	14	11	36
37	18	17	15	9	16	13	37
38	22	20	18	12	20	16	38
39	26	23	22	13	24	18	39
40	31	27	26	17	29	22	40
41	34	30	27	19	31	24	41
42	37	35	31	22	34	28	42
43	41	37	35	25	38	31	43
44	45	44	39	29	42	36	44
45	50	49	41	31	45	40	45
46	54	53	45	34	49	43	46
47	59	57	49	38	53	47	47
48	61	60	53	40	57	50	48
49	66	63	57	46	61	54	49
50	69	66	59	50	64	58	50
51	72	71	63	53	68	62	51
52	76	74	66	55	71	64	52
53	79	77	69	58	74	67	53
54	82	79	71	61	76	70	54
55	85	82	74	65	80	73	55
56	86	84	77	68	82	76	56
57	89	87	80	73	84	80	57
58	91	88	83	76	87	82	58
59	93	91	84	80	89	85	59
60	94	92	87	82	90	87	60
61	96	95	89	87	92	91	61
62	97	97	92	90	94	94	62
63	98	98	94	91	96	94	63
64	99	99	95	94	97	96	64
65	99	99	96	96	98	97	65
66	99	99	98	97	99	98	66
67	99	99	99	97	99	98	67
68 and more	99	99	99	99	99	99	68 and more

Note: EE = Sum of GS + AR + MK + EI Standard Scores reconverted to Standard Scores.

TABLE B-3

ASVAB 14 (A, B, & C) HEALTH, SOCIAL & TECHNOLOGY (HST) COMPOSITE PERCENTILE NORMS BY SEX AND GRADE

Standard Score	Females Grade		Males Grade		Total Grade		Standard Score
	11th	12th	11th	12th	11th	12th	
26 and less	1	1	1	1	1	1	26 and less
27	1	1	2	1	1	1	27
28	1	1	3	1	2	1	28
29	1	1	3	1	2	1	29
30	2	2	5	3	4	3	30
31	3	3	6	3	5	3	31
32	5	4	7	4	6	4	32
33	7	7	10	6	9	6	33
34	9	8	12	7	11	8	34
35	13	11	15	9	14	10	35
36	17	14	18	10	17	12	36
37	18	15	20	10	19	13	37
38	21	18	22	13	21	15	38
39	25	23	23	15	24	19	39
40	27	24	25	16	26	20	40
41	32	29	27	19	30	24	41
42	35	33	32	23	34	28	42
43	40	36	34	24	37	29	43
44	44	39	38	27	41	33	44
45	50	43	43	32	46	37	45
46	52	46	44	35	48	40	46
47	57	52	47	38	52	45	47
48	61	57	49	39	55	48	48
49	67	61	51	44	59	52	49
50	71	67	55	47	63	57	50
51	74	70	59	50	66	60	51
52	79	73	62	55	70	64	52
53	81	78	65	61	73	69	53
54	83	80	70	62	77	71	54
55	87	83	75	65	81	74	55
56	89	86	78	68	84	77	56
57	91	88	81	72	86	80	57
58	94	91	85	75	89	83	58
59	96	93	87	80	91	87	59
60	97	94	90	83	93	89	60
61	97	97	93	88	95	93	61
62	97	99	95	93	96	96	62
63	98	99	96	94	97	96	63
64	99	99	98	95	99	97	64
65	99	99	99	96	99	98	65
66 and more	99	99	99	99	99	99	66 and more

Note: HST = Sum of AR + VE + MC Standard Scores reconverted to Standard Scores.

B-10

ASVAB 14 (A, B, & C) OCCUPATIONAL COMPOSITE PERCENTILE NORMS FOR 2-YEAR COLLEGE STUDENTS

Standard Score	Females				Males				Standard Score
	MC	BC	EE	HST	MC	BC	EE	HST	
32 and less	1	1	1	1	1	1	1	1	32 and less
33	3	1	1	2	1	1	1	1	33
34	5	1	3	3	1	2	1	1	34
35	6	2	3	4	1	2	1	1	35
36	7	2	6	6	2	2	2	3	36
37	10	4	7	6	3	3	2	4	37
38	13	5	9	9	3	4	2	4	38
39	17	6	11	11	4	5	3	5	39
40	18	7	13	13	5	7	4	6	40
41	24	8	17	16	6	8	5	7	41
42	26	10	22	19	7	9	7	8	42
43	29	12	23	20	9	11	10	8	43
44	31	14	27	25	10	13	11	11	44
45	40	16	30	28	12	14	13	12	45
46	43	18	34	32	13	15	17	13	46
47	50	23	39	37	15	17	19	15	47
48	55	25	41	39	16	19	19	18	48
49	61	29	46	43	18	21	21	20	49
50	64	32	49	46	20	24	24	21	50
51	69	35	54	49	22	31	27	22	51
52	73	38	58	54	24	38	32	25	52
53	77	41	62	61	26	43	33	32	53
54	80	50	66	68	29	52	35	33	54
55	86	55	73	71	34	57	39	38	55
56	89	60	78	75	36	59	43	43	56
57	92	68	82	79	42	65	50	43	57
58	93	73	83	84	46	69	54	54	58
59	97	78	89	88	52	74	60	63	59
60	98	82	89	93	54	77	61	67	60
61	99	87	93	95	60	85	70	73	61
62	99	91	95	99	65	89	74	77	62
63	99	95	96	99	72	93	77	80	63
64	99	96	98	99	77	95	80	87	64
65	99	98	99	99	80	96	85	88	65
66	99	99	99	99	84	98	92	97	66
67	99	99	99	99	89	98	96	99	67
68	99	99	99	99	91	99	98	99	68
69	99	99	99	99	98	99	99	99	69
70 and more	99	99	99	99	99	99	99	99	70 and more

TABLE B-3

ASVAB 14 (A, B, & C) OCCUPATIONAL COMPOSITE PERCENTILE NORMS FOR 2-YEAR COLLEGE STUDENTS (COMBINED)

| Standard Score | MC | Composites | | HST | Standard Score |
		BC	EE		
32 and less	1	1	1	1	32 and less
33	2	1	1	2	33
34	3	2	2	2	34
35	4	2	2	3	35
36	5	2	4	4	36
37	7	3	5	5	37
38	9	4	6	7	38
39	11	5	7	8	39
40	13	7	9	10	40
41	16	8	11	12	41
42	18	10	15	14	42
43	20	12	17	15	43
44	22	14	20	18	44
45	27	15	22	21	45
46	30	17	26	24	46
47	35	20	30	27	47
48	38	22	32	30	48
49	42	26	35	33	49
50	45	29	38	35	50
51	49	33	42	37	51
52	52	38	47	41	52
53	55	42	50	48	53
54	58	50	52	53	54
55	63	56	58	56	55
56	66	60	63	61	56
57	70	67	68	66	57
58	73	71	70	71	58
59	77	76	76	77	59
60	79	80	77	81	60
61	82	86	83	85	61
62	84	90	86	89	62
63	87	94	87	91	63
64	90	96	90	94	64
65	91	97	93	94	65
66	93	99	96	99	66
67	95	99	98	99	67
68	96	99	99	99	68
69 and more	99	99	99	99	69 and more

TABLE B-3

ASVAB 14 (A, B, & C) VERBAL (VBL) COMPOSITE PERCENTILE NORMS BY SEX AND GRADE

Standard Score	Females Grade		Males Grade		Total Grade		Standard Score
	11th	12th	11th	12th	11th	12th	
22 and less	1	1	1	1	1	1	22 and less
23	1	1	2	1	1	1	23
24	1	1	2	1	2	1	24
25	1	1	4	2	2	1	25
26	1	2	4	3	3	2	26
27	2	2	5	3	3	3	27
28	3	3	6	4	4	3	28
29	4	4	7	5	5	4	29
30	5	5	9	6	7	5	30
31	6	6	10	6	8	6	31
32	8	7	12	7	10	7	32
33	10	9	14	8	12	8	33
34	13	10	16	10	14	10	34
35	14	11	18	11	16	11	35
36	15	12	19	14	17	13	36
37	18	15	21	15	19	15	37
38	20	16	24	16	22	16	38
39	23	17	26	17	24	17	39
40	25	20	28	19	26	19	40
41	28	22	31	20	29	21	41
42	31	24	33	24	32	24	42
43	34	27	35	26	35	26	43
44	36	29	38	28	37	28	44
45	40	32	41	31	41	32	45
46	44	36	44	36	44	36	46
47	49	40	47	39	48	39	47
48	51	44	51	41	51	42	48
49	57	49	55	44	56	47	49
50	62	54	59	47	61	51	50
51	67	60	63	53	65	56	51
52	69	63	66	56	67	59	52
53	72	68	70	61	71	65	53
54	78	74	74	65	76	70	54
55	82	78	78	71	80	74	55
56	84	81	81	75	82	78	56
57	87	87	84	79	86	83	57
58	91	91	88	84	90	87	58
59	94	94	92	88	93	91	59
60	97	95	95	92	96	93	60
61	98	97	99	94	98	95	61
62	99	99	99	97	99	98	62
63 and more	99	99	99	99	99	99	63 and more

Note: VBL = Sum of GS + WK + PC Standard Scores reconverted to Standard Scores.

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TABLE B-3

ASVAB 14 (A, B, & C) MATH (MTH) COMPOSITE PERCENTILE NORMS BY SEX AND GRADE

Standard Score	Females Grade		Males Grade		Total Grade		Standard Score
	11th	12th	11th	12th	11th	12th	
31 and less	1	1	1	1	1	1	31 and less
32	1	1	1	1	1	1	32
33	1	1	2	1	2	1	33
34	3	3	5	2	4	3	34
35	4	5	9	4	6	5	35
36	8	7	11	7	10	7	36
37	12	11	16	9	14	10	37
38	14	13	17	11	16	12	38
39	18	16	22	14	20	15	39
40	23	22	26	18	25	20	40
41	27	26	30	23	28	25	41
42	30	29	34	26	32	27	42
43	34	34	37	30	36	32	43
44	41	39	41	32	41	36	44
45	44	43	45	36	45	40	45
46	47	47	49	39	48	43	46
47	50	52	53	43	52	47	47
48	53	56	56	47	54	51	48
49	57	58	58	50	58	54	49
50	58	60	60	52	59	56	50
51	62	63	63	55	62	59	51
52	67	66	65	58	66	61	52
53	68	69	68	62	68	65	53
54	72	72	72	64	72	68	54
55	75	75	74	67	75	71	55
56	78	77	76	71	77	74	56
57	80	81	79	74	79	77	57
58	83	84	80	76	81	80	58
59	85	85	81	79	83	82	59
60	87	86	83	83	85	84	60
61	89	86	85	84	87	85	61
62	90	89	87	86	88	87	62
63	92	92	91	88	92	90	63
64	94	94	92	91	93	92	64
65	95	95	95	93	95	94	65
66	97	97	98	96	97	96	66
67	99	99	99	98	99	98	67
68 and more	99	99	99	99	99	99	68 and more

Note: MTH = Sum of AR + MK Standard Scores reconverted to Standard Scores.

ASVAB 14 (A, B, & C) ACADEMIC ABILITY (AA) COMPOSITE PERCENTILE NORMS BY SEX AND GRADE

Standard Score	Females Grade		Males Grade		Total Grade		Standard Score
	11th	12th	11th	12th	11th	12th	
25 and less	1	1	1	1	1	1	25 and less
26	1	1	1	1	1	1	26
27	1	1	3	1	1	1	27
28	1	1	4	2	3	2	28
29	1	2	4	2	3	2	29
30	2	3	7	3	4	3	30
31	3	4	8	4	6	4	31
32	5	5	9	6	7	5	32
33	7	7	11	7	9	7	33
34	11	9	13	9	12	9	34
35	13	10	17	10	15	10	35
36	14	12	18	10	16	11	36
37	18	13	21	13	19	13	37
38	21	17	25	15	23	16	38
39	22	19	28	19	25	19	39
40	25	22	30	21	27	21	40
41	28	26	32	23	30	25	41
42	32	29	35	26	33	27	42
43	35	31	37	28	36	29	43
44	38	34	39	29	39	32	44
45	44	38	42	32	43	35	45
46	46	41	46	35	46	38	46
47	52	44	50	39	51	41	47
48	56	48	54	42	55	45	48
49	58	50	55	44	56	47	49
50	63	57	59	48	61	53	50
51	66	62	63	54	64	58	51
52	72	67	66	58	69	62	52
53	77	72	70	61	74	67	53
54	81	76	75	67	78	71	54
55	83	81	78	70	81	75	55
56	84	81	80	72	82	77	56
57	87	84	83	76	85	80	57
58	90	86	86	80	88	83	58
59	91	89	88	85	90	87	59
60	93	92	91	88	92	90	60
61	94	94	94	92	94	93	61
62	97	97	97	94	97	95	62
63	98	98	98	95	98	97	63
64	99	99	99	98	99	99	64
65 and more	99	99	99	99	99	99	65 and more

Note: AA = Sum of AR + VE Standard Scores reconverted to Standard Scores.

TABLE B-3

ASVAB 14 (A, B, & C) COMPOSITE PERCENTILE NORMS FOR
THE 1980 YOUTH POPULATION

Standard Score	Composites							Standard Score
	VBL	MTH	AA	MC	BC	EE	HST	
24 and less	1	1	1	1	1	1	1	24 and less
25	2	1	1	1	1	1	1	25
26	3	1	1	1	1	1	1	26
27	3	1	1	1	2	1	1	27
28	4	1	2	1	3	1	1	28
29	5	1	3	1	4	1	2	29
30	6	1	4	1	5	1	3	30
31	7	1	5	2	5	2	4	31
32	8	1	6	3	6	3	5	32
33	9	2	8	4	7	4	7	33
34	10	3	9	6	9	6	8	34
35	11	5	11	8	10	8	10	35
36	13	8	12	10	11	11	12	36
37	14	12	14	13	12	13	14	37
38	15	14	16	15	14	15	16	38
39	16	17	18	18	16	17	18	39
40	18	21	20	21	18	20	20	40
41	20	26	22	24	20	22	22	41
42	22	29	25	26	22	26	25	42
43	24	32	26	29	26	29	27	43
44	26	36	29	32	28	33	30	44
45	28	39	31	36	31	35	33	45
46	31	42	34	38	33	39	35	46
47	34	46	37	42	37	43	39	47
48	36	48	40	45	41	45	41	48
49	39	52	42	49	44	49	45	49
50	42	53	46	51	49	51	48	50
51	47	56	49	55	51	55	51	51
52	50	59	53	57	56	58	55	52
53	55	61	57	61	59	62	59	53
54	60	64	61	64	63	64	62	54
55	65	67	65	68	67	67	66	55
56	69	70	67	71	70	70	69	56
57	74	73	71	74	74	73	73	57
58	79	76	76	77	77	76	77	58
59	84	78	80	80	81	79	80	59
60	88	80	84	82	84	82	83	60
61	92	81	87	85	88	85	87	61
62	96	84	92	87	90	88	91	62
63	98	87	94	90	94	90	93	63
64	99	90	98	92	96	92	95	64
65	99	92	99	94	97	94	97	65
66	99	96	99	96	99	96	99	66
67	99	98	99	98	99	98	99	67
68 and more	99	99	99	99	99	99	99	68 and more

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ACADEMIC COMPOSITE PERCENTILE NORMS FOR STUDENTS ATTENDING 2-YEAR COLLEGES

Standard Score	Females			Males			Total			Standard Score
	VBL	MTH	AA	VBL	MTH	AA	VBL	MTH	AA	
30 and less	1	1	1	1	1	1	1	1	1	30 and less
31	1	1	1	2	1	1	1	1	1	31
32	1	1	1	2	1	1	1	1	1	32
33	2	1	1	2	1	1	2	1	1	33
34	2	1	2	3	1	2	3	1	2	34
35	3	2	3	3	2	2	3	2	3	35
36	4	4	4	4	2	3	4	3	3	36
37	4	5	5	4	3	3	4	4	4	37
38	5	7	6	4	4	3	5	6	5	38
39	6	8	9	5	4	6	6	7	8	39
40	8	13	11	5	7	7	6	10	9	40
41	9	17	13	7	10	7	8	14	10	41
42	10	19	14	7	12	8	9	16	12	42
43	12	23	14	9	14	9	11	19	12	43
44	14	26	17	9	16	10	11	22	14	44
45	17	31	21	10	18	14	14	25	18	45
46	20	33	25	12	19	15	16	27	20	46
47	23	38	29	15	21	17	20	30	24	47
48	25	41	31	18	23	19	22	33	26	48
49	28	44	34	20	24	20	25	35	28	49
50	34	44	38	23	25	23	29	36	31	50
51	39	47	42	26	31	25	34	40	35	51
52	43	51	48	28	35	29	37	44	40	52
53	47	54	52	35	37	35	42	47	44	53
54	55	60	58	40	42	40	48	52	50	54
55	62	66	63	47	44	45	55	56	55	55
56	68	70	65	52	48	46	61	60	57	56
57	75	70	71	58	55	53	61	65	63	57
58	83	77	75	67	60	59	76	70	68	58
59	88	81	82	75	62	65	82	72	74	59
60	90	83	88	77	65	72	85	75	81	60
61	95	85	93	84	67	78	90	77	87	61
62	97	90	97	92	71	85	95	82	92	62
63	99	92	98	96	78	89	98	86	94	63
64	99	93	99	99	83	97	99	89	99	64
65	99	96	99	99	88	99	99	92	99	65
66	99	98	99	99	93	99	99	96	99	66
67	99	99	99	99	98	99	99	99	99	67
68 and more	99	99	99	99	99	99	99	99	99	68 and more

NOTE: Reproduced from U.S. Military Entrance Processing Command, DOD 1304.12X1, *Technical Supplement to the Counselor's Manual for the Armed Services Aptitude Battery Form-14,* July 1985, pp. 67-77.

TABLE B-4

ASVAB·14 (A, B, & C) MECHANICAL & CRAFTS (MC)
COMPOSITE PERCENTILE NORMS FOR GRADE 10

Score	Males	Females	Total
30	1	1	1
31	2	2	2
32	4	5	5
33	7	9	8
34	9	15	12
35	11	21	16
36	15	26	20
37	18	31	24
38	21	36	29
39	25	41	33
40	28	47	37
41	32	55	43
42	35	60	47
43	38	64	51
44	42	68	55
45	45	73	59
46	49	78	63
47	53	82	67
48	58	85	71
49	62	89	75
50	65	91	78
51	68	94	81
52	72	95	83
53	76	96	85
54	79	97	88
55	82	98	90
56	86	99	92
57	88	99	93
58	90	99	95
59	93	99	96
60	94	99	96
61	95	99	97
62	97	99	98
63	98	99	98
64	99	99	99

TABLE B-4

ASVAB 14 (A, B, & C) BUSINESS & CLERICAL (BC)
COMPOSITE PERCENTILE NORMS FOR GRADE 10

Score	Males	Females	Total
25	1	1	1
26	2	1	2
27	3	1	2
28	4	1	3
29	6	2	4
30	8	3	5
31	10	4	7
32	11	5	8
33	14	7	10
34	16	8	12
35	19	10	14
36	21	12	17
37	24	14	19
38	27	17	22
39	31	21	26
40	35	25	30
41	38	28	33
42	42	33	38
43	45	36	41
44	49	40	45
45	53	44	48
46	57	49	53
47	62	55	59
48	67	60	64
49	70	64	67
50	73	68	71
51	77	71	74
52	80	75	78
53	83	80	82
54	88	84	86
55	91	87	89
56	93	89	91
57	95	91	93
58	97	94	95
59	98	96	97
60	99	98	98
61	99	99	99

TABLE B-4

ASVAB 14 (A, B, & C) ELECTRONIC & ELECTRICAL (EE)
COMPOSITE PERCENTILE NORMS FOR GRADE 10

Score	Males	Females	Total
30	1	1	1
31	2	3	3
32	4	5	4
33	7	7	7
34	10	11	10
35	13	15	14
36	16	19	18
37	21	25	23
38	23	29	26
39	27	34	31
40	30	39	34
41	34	44	39
42	37	48	43
43	41	53	47
44	43	57	50
45	47	60	54
46	53	64	59
47	56	68	62
48	60	72	66
49	63	76	69
50	67	80	73
51	70	83	76
52	73	86	79
53	77	87	82
54	80	89	84
55	82	91	87
56	85	92	89
57	87	93	90
58	89	95	92
59	90	96	93
60	93	98	96
61	95	99	97
62	96	99	97
63	97	99	98
64	98	99	99
65	99	99	99

ASVAB 14 (A, B, & C) HEALTH, SOCIAL, & TECHNOLOGY (HST)
COMPOSITE PERCENTILE NORMS FOR GRADE 10

Score	Males	Females	Total
26	1	1	1
27	2	1	1
28	2	1	2
29	4	2	3
30	5	3	4
31	7	5	6
32	9	8	9
33	12	11	12
34	14	14	14
35	17	17	17
36	19	21	20
37	22	25	23
38	25	30	27
39	28	34	31
40	31	37	34
41	35	42	38
42	39	46	43
43	41	51	46
44	44	56	50
45	47	61	54
46	50	67	58
47	54	70	62
48	57	74	66
49	62	79	70
50	64	81	72
51	68	84	76
52	72	86	79
53	75	89	82
54	78	91	84
55	81	93	87
56	85	95	90
57	89	96	92
58	91	97	94
59	93	98	95
60	94	98	96
61	96	99	98
62	98	99	98
63	99	99	99

TABLE B-4

ASVAB 14 (A, B, & C) VERBAL (VBL) COMPOSITE
PERCENTILE NORMS FOR GRADE 10

Score	Males	Females	Total
23	1	1	1
24	2	1	2
25	4	1	3
26	4	2	3
27	5	3	4
28	6	4	5
29	8	7	7
30	9	9	9
31	11	10	10
32	13	12	13
33	16	14	15
34	18	17	17
35	19	19	19
36	22	21	22
37	25	24	24
38	27	26	27
39	30	29	29
40	32	31	32
41	35	35	35
42	39	40	39
43	42	44	43
44	44	49	47
45	48	53	51
46	52	58	55
47	56	62	59
48	59	65	62
49	63	68	65
50	67	72	69
51	71	76	73
52	75	80	77
53	78	84	81
54	82	87	85
55	84	90	87
56	87	92	89
57	90	94	92
58	94	97	95
59	96	98	97
60	98	99	98
61	99	99	99

ASVAB 14 (A, B, & C) MATH (MTH) COMPOSITE
PERCENTILE NORMS FOR GRADE 10

Score	Males	Females	Total
31	1	1	1
32	2	1	1
33	3	1	2
34	6	3	5
35	9	5	7
36	13	10	11
37	16	13	15
38	20	16	18
39	24	20	22
40	28	26	27
41	32	33	33
42	38	40	39
43	43	45	44
44	48	50	49
45	52	54	53
46	55	58	57
47	59	62	60
48	61	67	64
49	64	70	67
50	66	72	69
51	69	74	72
52	73	78	76
53	76	81	79
54	80	83	82
55	82	85	84
56	84	88	86
57	86	90	88
58	89	92	90
59	91	93	92
60	92	94	93
61	93	95	94
62	94	96	95
63	95	97	96
64	97	98	98
65	98	99	99
66	99	99	99

TABLE B-4

ASVAB 14 (A, B, & C) ACADEMIC ABILITY (AA) COMPOSITE
PERCENTILE NORMS FOR GRADE 10

Score	Males	Females	Total
25	1	1	1
26	2	1	2
27	3	1	2
28	4	2	3
29	4	2	3
30	6	3	5
31	8	5	7
32	10	8	9
33	13	12	12
34	16	14	15
35	18	17	18
36	22	20	21
37	25	23	24
38	27	26	27
39	30	30	30
40	34	35	35
41	37	40	38
42	40	44	42
43	43	47	45
44	46	51	48
45	50	56	53
46	54	61	58
47	59	66	62
48	62	70	66
49	64	73	69
50	68	78	73
51	72	81	76
52	75	84	79
53	78	86	82
54	82	88	85
55	85	90	87
56	87	91	89
57	89	93	91
58	92	94	93
59	95	96	95
60	97	98	97
61	98	99	99
62	99	99	99

APPENDIX C

FREQUENCY DISTRIBUTIONS OF THE ASVAB 8 AFQT
AND SUBTEST RAW SCORES IN THE 1980
YOUTH POPULATION

APPENDIX C

FREQUENCY DISTRIBUTIONS OF THE ASVAB 8 AFQT AND SUBTEST RAW SCORES IN THE 1980 YOUTH POPULATION

This appendix presents cumulative frequency distributions of ASVAB 8 scores in the 1980 Youth Population. Table C-1 shows the actual distribution of AFQT raw scores in half-point intervals. Tables C-2 and C-3 show the distributions for males and females, respectively. The first column in table C-1 lists the AFQT raw scores. The second column lists the weighted frequency of cases attaining each raw score. Weights were computed for each case to make the sample representative of the ASVAB Reference Population. The weights were determined by the National Opinion Research Center, which designed the sample and collected the data. The final column lists the cumulative percentages, which are converted to percentile scores. The AFQT cumulative distributions are based on the adjusted Numerical Operations (NO) raw scores (see table 1-5 of the main text for the adjustment).

The cumulative distribution in table C-1 was smoothed by the Air Force Human Resources Laboratory (AFHRL), the executive agent for ASVAB research and development.[1] The smoothed distributions are shown in annex C-1 for the total 1980 Youth Population (table C-37), males (table C-38), and females (table C-39). The official AFQT score scale is based on the smoothed cumulative distribution in table C-37. The unsmoothed distribution in table C-1 is similar, but not identical, to the smoothed values.

The cumulative frequency distributions of the ASVAB 8 subtest raw scores are shown in tables C-4 through C-36. The distributions are shown for the total population (tables C-4 through C-14), males (tables C-15 through C-25), and females (tables C-26 through C-36). Two sets of distributions are shown for NO and Coding Speed (CS); one based on the testing materials used with the ASVAB Reference Population, the other adjusted to reflect the scores that would be obtained with the testing materials used by the military services. The 1980 score scale is based on the adjusted NO and CS raw scores. The cumulative frequency distributions for the subtests are not used directly in the ASVAB score scale and are shown only for reference purposes.

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1. See Air Force Human Resources Laboratory, TP-85-21, *Armed Services Vocational Aptitude Battery: Equating and Implementation of Forms 11, 12, and 13 in the 1980 Youth Population Metric,* by Malcolm J. Ree, John R. Welsh, Toni G. Wegner, and James A. Earles, Unclassified, Nov 1985.

TABLE C-1

AFQT RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Cum pct	Raw score	Freq	Cum pct	Raw score	Freq	Cum pct
.0	3190	0.0	27.0	39913	2.6	50.0	99143	15.3
.5	1319	0.0	27.5	70090	2.9	50.5	127361	15.8
1.0	1264	0.0	28.0	30144	3.0	51.0	79525	16.1
2.0	1749	0.0	28.5	30277	3.1	51.5	84808	16.5
2.5	1719	0.0	29.0	52853	3.3	52.0	114241	16.9
3.0	1063	0.0	29.5	50362	3.5	52.5	89399	17.3
4.0	519	0.0	30.0	40693	3.7	53.0	113657	17.7
5.0	1121	0.0	30.5	46507	3.9	53.5	205027	18.5
5.5	682	0.0	31.0	63360	4.1	54.0	98521	18.9
6.0	2861	0.1	31.5	50029	4.3	54.5	113112	19.4
7.0	1221	0.1	32.0	63103	4.6	55.0	120345	19.8
7.5	1915	0.1	32.5	46380	4.8	55.5	121234	20.3
8.0	5503	0.1	33.0	54805	5.0	56.0	116342	20.8
8.5	3290	0.1	33.5	42078	5.1	56.5	154651	21.4
9.0	4123	0.1	34.0	56419	5.4	57.0	121022	21.9
9.5	1781	0.1	34.5	64264	5.6	57.5	126770	22.4
11.5	12785	0.2	35.0	49445	5.8	58.0	69666	22.6
12.0	1844	0.2	35.5	48646	6.0	58.5	136354	23.2
12.5	3296	0.2	36.0	58214	6.2	59.0	99639	23.6
13.0	9312	0.2	36.5	58503	6.5	59.5	136220	24.1
14.0	13764	0.3	37.0	47125	6.6	60.0	122281	24.6
14.5	5642	0.3	37.5	90121	7.0	60.5	140149	25.1
15.0	7975	0.3	38.0	65136	7.3	61.0	121108	25.6
15.5	5096	0.4	38.5	56750	7.5	61.5	176911	26.3
16.0	3477	0.4	39.0	90356	7.8	62.0	106092	26.7
16.5	8164	0.4	39.5	89689	8.2	62.5	144597	27.3
17.0	25937	0.5	40.0	50232	8.4	63.0	118520	27.8
17.5	14969	0.6	40.5	85488	8.7	63.5	122301	28.2
18.0	29682	0.7	41.0	84368	9.1	64.0	164514	28.9
18.5	16824	0.8	41.5	98494	9.4	64.5	189689	29.6
19.0	21625	0.8	42.0	83242	9.8	65.0	216105	30.5
19.5	10997	0.9	42.5	68412	10.0	65.5	123070	31.0
20.0	26814	1.0	43.0	79712	10.3	66.0	148468	31.6
20.5	19832	1.1	43.5	87328	10.7	66.5	181081	32.3
21.0	20615	1.1	44.0	66868	11.0	67.0	175493	33.0
21.5	20928	1.2	44.5	83586	11.3	67.5	239083	33.9
22.0	20543	1.3	45.0	75027	11.6	68.0	179881	34.6
22.5	17170	1.4	45.5	133378	12.1	68.5	199233	35.4
23.0	47798	1.6	46.0	105954	12.5	69.0	168479	36.1
23.5	21011	1.7	46.5	76540	12.8	69.5	171382	36.7
24.0	31552	1.8	47.0	81741	13.1	70.0	144921	37.3
24.5	34569	1.9	47.5	111047	13.6	70.5	237526	38.2
25.0	47563	2.1	48.0	90897	13.9	71.0	191726	39.0
25.5	28721	2.2	48.5	102580	14.3	71.5	218497	39.8
26.0	39966	2.4	49.0	64704	14.6	72.0	205626	40.7
26.5	22471	2.5	49.5	87841	14.9	72.5	195719	41.4

TABLE C-1 (Continued)

Raw score	Freq	Cum pct	Raw score	Freq	Cum pct	Raw score	Freq	Cum pct
73.0	227890	42.3	84.0	337101	62.0	95.0	228337	84.7
73.5	242072	43.3	84.5	220747	62.9	95.5	228308	85.6
74.0	193011	44.0	85.0	371725	64.4	96.0	287195	86.7
74.5	194877	44.8	85.5	246140	65.3	96.5	152001	87.3
75.0	124519	45.3	86.0	258654	66.3	97.0	365167	88.8
75.5	206114	46.1	86.5	208451	67.2	97.5	227324	89.7
76.0	159283	46.7	87.0	260198	68.2	98.0	335068	91.0
76.5	173561	47.4	87.5	213495	69.0	98.5	133071	91.5
77.0	183225	48.1	88.0	250228	70.0	99.0	312479	92.7
77.5	287025	49.3	88.5	234277	70.9	99.5	146263	93.3
78.0	166507	49.9	89.0	306434	72.1	100.0	231862	94.2
78.5	227394	50.8	89.5	260450	73.2	100.5	168973	94.9
79.0	203348	51.6	90.0	336758	74.5	101.0	282488	96.0
79.5	231824	52.5	90.5	262486	75.5	101.5	113441	96.4
80.0	247227	53.5	91.0	238906	76.5	102.0	257697	97.5
80.5	248528	54.5	91.5	237365	77.4	102.5	91873	97.8
81.0	169018	55.1	92.0	329384	78.7	103.0	247902	98.8
81.5	305735	56.3	92.5	234554	79.6	103.5	28025	98.9
82.0	265650	57.4	93.0	340821	81.0	104.0	193057	99.7
82.5	251481	58.4	93.5	170613	81.6	104.5	10165	99.7
83.0	309016	59.6	94.0	339697	83.0	105.0	74779	100.0
83.5	278830	60.7	94.5	212467	83.8			

MEAN	73.908					MEDIAN	78.500	
MODE	85.000		STD DEV		20.807	VARIANCE	432.931	
KURTOSIS	-0.225					SKEWNESS	-0.713	

VALID CASES 25409021

NOTE: Data are based on raw scores; not all raw scores occurred.

TABLE C-2

AFQT RAW SCORES FOR MALES

Raw score	Freq	Cum pct	Raw score	Freq	Cum pct	Raw score	Freq	Cum pct
2.0	1749	0.0	31.0	36591	4.8	54.0	58936	20.0
4.0	519	0.0	31.5	26248	5.0	54.5	48857	20.4
6.0	1847	0.0	32.0	45306	5.3	55.0	65008	20.9
7.0	1221	0.0	32.5	29058	5.6	55.5	63524	21.4
7.5	1049	0.0	33.0	25671	5.8	56.0	70658	21.9
8.0	4476	0.1	33.5	7968	5.8	56.5	55575	22.3
8.5	3290	0.1	34.0	30895	6.1	57.0	82775	23.0
9.0	3138	0.1	34.5	32843	6.3	57.5	66540	23.5
9.5	1781	0.1	35.0	25212	6.5	58.0	37439	23.8
11.5	7344	0.2	35.5	36254	6.8	58.5	77591	24.4
12.5	902	0.2	36.0	38436	7.1	59.0	32083	24.6
13.0	1180	0.2	36.5	34091	7.3	59.5	66006	25.2
14.0	7630	0.3	37.0	24622	7.5	60.0	57958	25.6
14.5	4470	0.3	37.5	45049	7.9	60.5	61579	26.1
15.0	6122	0.4	38.0	24770	8.1	61.0	62240	26.6
15.5	3200	0.4	38.5	30259	8.3	61.5	79937	27.2
16.0	2433	0.4	39.0	31411	8.6	62.0	59415	27.6
16.5	5912	0.5	39.5	59543	9.0	62.5	66251	28.2
17.0	13123	0.6	40.0	32075	9.3	63.0	71063	28.7
17.5	13392	0.7	40.5	56788	9.7	63.5	39289	29.0
18.0	25389	0.9	41.0	48919	10.1	64.0	60004	29.5
18.5	4074	0.9	41.5	53329	10.5	64.5	60709	30.0
19.0	10191	1.0	42.0	58745	11.0	65.0	94220	30.7
19.5	5010	1.0	42.5	21823	11.1	65.5	53091	31.1
20.0	14269	1.1	43.0	31171	11.4	66.0	34960	31.4
20.5	12895	1.2	43.5	60640	11.8	66.5	74151	31.9
21.0	10146	1.3	44.0	37821	12.1	67.0	73914	32.5
21.5	8271	1.4	44.5	42766	12.5	67.5	122517	33.5
22.0	11336	1.4	45.0	35411	12.7	68.0	65676	34.0
22.5	10447	1.5	45.5	65088	13.2	68.5	80326	34.6
23.0	32487	1.8	46.0	50862	13.6	69.0	68595	35.1
23.5	18631	1.9	46.5	41351	14.0	69.5	100003	35.9
24.0	21138	2.1	47.0	25797	14.2	70.0	85555	36.6
24.5	25373	2.3	47.5	32241	14.4	70.5	118511	37.5
25.0	15642	2.4	48.0	46687	14.8	71.0	76038	38.1
25.5	17728	2.5	48.5	58793	15.2	71.5	115267	39.0
26.0	20351	2.7	49.0	33008	15.5	72.0	101294	39.8
26.5	11461	2.8	49.5	52681	15.9	72.5	114553	40.6
27.0	22296	3.0	50.0	58712	16.3	73.0	91125	41.4
27.5	46281	3.3	50.5	62786	16.8	73.5	109702	42.2
28.0	19101	3.5	51.0	29819	17.1	74.0	83922	42.9
28.5	15811	3.6	51.5	47452	17.4	74.5	100350	43.6
29.0	37594	3.9	52.0	45223	17.8	75.0	64221	44.1
29.5	33680	4.1	52.5	59428	18.2	75.5	117791	45.0
30.0	22418	4.3	53.0	65074	18.8	76.0	50889	45.4
30.5	21928	4.5	53.5	100057	19.5	76.5	67473	46.0

TABLE C-2 (Continued)

Raw score	Freq	Cum pct	Raw score	Freq	Cum pct	Raw score	Freq	Cum pct
77.0	117273	46.9	86.5	86966	64.5	96.0	129806	85.2
77.5	141105	48.0	87.0	123453	65.5	96.5	79975	85.8
78.0	91312	48.7	87.5	122056	66.4	97.0	165705	87.1
78.5	99584	49.4	88.0	123445	67.4	97.5	145698	88.2
79.0	87706	50.1	88.5	121947	68.3	98.0	179610	89.6
79.5	119870	51.1	89.0	187773	69.8	98.5	76394	90.2
80.0	113167	51.9	89.5	170375	71.1	99.0	168324	91.5
80.5	124040	52.9	90.0	150109	72.3	99.5	107554	92.4
81.0	91022	53.6	90.5	138610	73.4	100.0	141941	93.5
81.5	148688	54.8	91.0	117854	74.3	100.5	91325	94.2
82.0	118828	55.7	91.5	152466	75.5	101.0	170026	95.5
82.5	100314	56.5	92.0	187994	76.9	101.5	63605	96.0
83.0	143715	57.6	92.5	114926	77.8	102.0	131531	97.0
83.5	117845	58.5	93.0	197100	79.3	102.5	62205	97.5
84.0	154309	59.7	93.5	94688	80.1	103.0	146605	98.6
84.5	85734	60.3	94.0	184704	81.5	103.5	17766	98.8
85.0	199094	61.9	94.5	110816	82.4	104.0	115134	99.6
85.5	111645	62.8	95.0	119287	83.3	105.0	45394	100.0
86.0	142332	63.9	95.5	115322	84.2			

MEAN	74.082			MEDIAN	79.000
MODE	85.000	STD DEV	21.578	VARIANCE	465.589
KURTOSIS	-0.327			SKEWNESS	-0.725

VALID CASES 12891155

NOTE: Data are based on adjusted NO raw scores; not all raw scores occurred.

TABLE C-3

AFQT RAW SCORES FOR FEMALES

Raw score	Freq	Cum pct	Raw score	Freq	Cum pct	Raw score	Freq	Cum pct
.0	3190	0.0	29.5	16683	2.9	52.5	29971	16.3
.5	1319	0.0	30.0	18274	3.1	53.0	48583	16.7
1.0	1264	0.0	30.5	24579	3.2	53.5	104971	17.5
2.5	1719	0.1	31.0	26769	3.5	54.0	39586	17.8
3.0	1063	0.1	31.5	23781	3.7	54.5	64255	18.3
5.0	1121	0.1	32.0	17797	3.8	55.0	55337	18.8
5.5	682	0.1	32.5	17322	3.9	55.5	57711	19.2
6.0	1014	0.1	33.0	29134	4.2	56.0	45684	19.6
7.5	866	0.1	33.5	34110	4.4	56.5	99076	20.4
8.0	1026	0.1	34.0	25524	4.6	57.0	38246	20.7
9.0	985	0.1	34.5	31421	4.9	57.5	60229	21.2
11.5	5441	0.2	35.0	24233	5.1	58.0	32228	21.4
12.0	1844	0.2	35.5	12392	5.2	58.5	58763	21.9
12.5	2394	0.2	36.0	19777	5.3	59.0	67556	22.5
13.0	8132	0.3	36.5	24412	5.5	59.5	70214	23.0
14.0	6134	0.3	37.0	22502	5.7	60.0	64323	23.5
14.5	1172	0.3	37.5	45073	6.1	60.5	78570	24.2
15.0	1853	0.3	38.0	40367	6.4	61.0	58868	24.6
15.5	1897	0.3	38.5	26491	6.6	61.5	96975	25.4
16.0	1044	0.4	39.0	58945	7.1	62.0	46677	25.8
16.5	2253	0.4	39.5	30147	7.3	62.5	78346	26.4
17.0	12815	0.5	40.0	18157	7.5	63.0	47457	26.8
17.5	1578	0.5	40.5	28700	7.7	63.5	83012	27.4
18.0	4292	0.5	41.0	35449	8.0	64.0	104510	28.3
18.5	12749	0.6	41.5	45165	8.3	64.5	128980	29.3
19.0	11434	0.7	42.0	24497	8.5	65.0	121885	30.3
19.5	5987	0.8	42.5	46589	8.9	65.5	69979	30.8
20.0	12545	0.9	43.0	48541	9.3	66.0	113507	31.8
20.5	6937	0.9	43.5	26688	9.5	66.5	106931	32.6
21.0	10469	1.0	44.0	29047	9.7	67.0	101580	33.4
21.5	12657	1.1	44.5	40821	10.1	67.5	116566	34.3
22.0	9208	1.2	45.0	39616	10.4	68.0	114205	35.3
22.5	6722	1.2	45.5	68290	10.9	68.5	118907	36.2
23.0	15310	1.4	46.0	55092	11.4	69.0	99885	37.0
23.5	2381	1.4	46.5	35189	11.7	69.5	71378	37.6
24.0	10414	1.5	47.0	55944	12.1	70.0	59367	38.1
24.5	9196	1.5	47.5	78806	12.7	70.5	119015	39.0
25.0	31921	1.8	48.0	44209	13.1	71.0	115688	39.9
25.5	10993	1.9	48.5	43787	13.4	71.5	103230	40.8
26.0	19615	2.0	49.0	31696	13.7	72.0	104332	41.6
26.5	11010	2.1	49.5	35160	14.0	72.5	81166	42.2
27.0	17617	2.3	50.0	40431	14.3	73.0	136764	43.3
27.5	23809	2.4	50.5	64575	14.8	73.5	132370	44.4
28.0	11043	2.5	51.0	49706	15.2	74.0	109089	45.3
28.5	14466	2.6	51.5	37356	15.5	74.5	94527	46.0
29.0	15258	2.8	52.0	69018	16.0	75.0	60297	46.5

TABLE C-3 (Continued)

Raw score	Freq	Cum pct	Raw score	Freq	Cum pct	Raw score	Freq	Cum pct
75.5	88323	47.2	85.5	134495	68.0	95.5	112986	87.1
76.0	108394	48.1	86.0	116322	68.9	96.0	157389	88.3
76.5	106088	48.9	86.5	121485	69.9	96.5	72026	88.9
77.0	65952	49.4	87.0	136745	71.0	97.0	199462	90.5
77.5	145920	50.6	87.5	91438	71.7	97.5	81626	91.1
78.0	75194	51.2	88.0	126783	72.7	98.0	155458	92.4
78.5	127810	52.2	88.5	112330	73.6	98.5	56677	92.8
79.0	115642	53.1	89.0	118661	74.5	99.0	144155	94.0
79.5	111955	54.0	89.5	90076	75.3	99.5	38709	94.3
80.0	134060	55.1	90.0	186649	76.8	100.0	89921	95.0
80.5	124488	56.1	90.5	123876	77.7	100.5	77648	95.6
81.0	77996	56.7	91.0	121052	78.7	101.0	112462	96.5
81.5	157046	58.0	91.5	84899	79.4	101.5	49836	96.9
82.0	146822	59.2	92.0	141390	80.5	102.0	126166	97.9
82.5	151167	60.4	92.5	119628	81.5	102.5	29669	98.2
83.0	165300	61.7	93.0	143721	82.6	103.0	101298	99.0
83.5	160986	63.0	93.5	75924	83.2	103.5	10260	99.1
84.0	182792	64.4	94.0	154993	84.5	104.0	77924	99.7
84.5	135014	65.5	94.5	101651	85.3	104.5	10165	99.8
85.0	172630	66.9	95.0	109049	86.2	105.0	29384	100.0

MEAN	73.728					MEDIAN		77.500
MODE	97.000		STD DEV		19.981	VARIANCE		399.235
KURTOSIS	-0.114					SKEWNESS		-0.699

VALID CASES 12517866

NOTE: Data are based on adjusted NO raw scores; not all raw scores occurred.

TABLE C-4

GENERAL SCIENCE RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Pct.	Cum pct.
0	31998	.1	.1
1	23964	.1	.2
2	67423	.3	.5
3	86717	.3	.8
4	130944	.5	1.3
5	259976	1.0	2.4
6	442613	1.7	4.1
7	439323	1.7	5.8
8	606516	2.4	8.2
9	790718	3.1	11.3
10	933041	3.7	15.0
11	1077134	4.2	19.2
12	1284144	5.1	24.3
13	1525413	6.0	30.3
14	1884883	7.4	37.7
15	1743771	6.9	44.6
16	1865190	7.3	51.9
17	1945123	7.7	59.6
18	1914507	7.5	67.1
19	1517623	6.0	73.1
20	1730653	6.8	79.9
21	1411462	5.6	85.5
22	1217214	4.8	90.2
23	1010662	4.0	94.2
24	812234	3.2	97.4
25	•655773	2.6	100.0

MEAN	15.950			MEDIAN	16.00
MODE	17.000	STD DEV	5.010	VARIANCE	25.104
KURTOSIS	-0.386			SKEWNESS	-0.324

VALID CASES 25409021

TABLE C-5

ARITHMETIC REASONING RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Pct.	Cum pct.
0	27907	.1	.1
1	13327	.1	.2
2	20023	.1	.2
3	70723	.3	.5
4	171904	.7	1.2
5	278205	1.1	2.3
6	545007	2.1	4.4
7	708548	2.8	7.2
8	938098	3.7	10.9
9	1094765	4.3	15.2
10	1164249	4.6	19.8
11	1054663	4.2	24.0
12	1224793	4.8	28.8
13	1007625	4.0	32.7
14	1054186	4.1	36.9
15	937231	3.7	40.6
16	1111310	4.4	45.0
17	882310	3.5	48.4
18	1063146	4.2	52.6
19	967662	3.8	56.4
20	942693	3.7	60.1
21	899726	3.5	63.7
22	943054	3.7	67.4
23	843758	3.3	70.7
24	1082342	4.3	75.0
25	1025117	4.0	79.0
26	959314	3.8	82.8
27	973858	3.8	86.6
28	1128336	4.4	91.0
29	1087594	4.3	95.3
30	1187546	4.7	100.0

MEAN	18.009			MEDIAN	18.000
MODE	12.000	STD DEV	7.373	VARIANCE	54.366
KURTOSIS	-1.156			SKEWNESS	-0.013

VALID CASES 25409021

TABLE C-6

WORD KNOWLEDGE RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	35556	0	0	12	332291	1	8	24	770268	3	33
1	7306	0	0	13	339591	1	9	25	1021789	4	37
2	29334	0	0	14	348522	1	10	26	919462	4	40
3	24837	0	0	15	414632	2	12	27	1134724	4	45
4	74793	0	1	16	385486	2	14	28	1286408	5	50
5	80204	0	1	17	441050	2	15	29	1573034	6	56
6	143279	1	2	18	512953	2	17	30	1457723	6	62
7	285909	1	3	19	507486	2	19	31	1657331	7	68
8	196335	1	3	20	516789	2	21	32	1820942	7	75
9	227496	1	4	21	698086	3	24	33	2094344	8	84
10	256120	1	5	22	682439	3	27	34	2082742	8	92
11	260599	1	6	23	703441	3	30	35	2085719	8	100

MEAN	26.270			MEDIAN	29.000
MODE	33.000	STD DEV	7.710	VARIANCE	59.440
KURTOSIS	.219			SKEWNESS	-1.003

VALID CASES 25409021

TABLE C-7

PARAGRAPH COMPREHENSION RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Pct.	Cum pct.
0	68192	.3	.3
1	111001	.4	.7
2	280820	1.1	1.8
3	439501	1.7	3.5
4	724266	2.9	6.4
5	799324	3.1	9.5
6	877110	3.5	13.0
7	1029540	4.1	17.0
8	1141481	4.5	21.5
9	1300588	5.1	26.7
10	1635560	6.4	33.1
11	2622209	10.3	43.4
12	3351018	13.2	56.6
13	4509590	17.7	74.3
14	4243398	16.7	91.0
15	2275424	9.0	100.0

MEAN	11.011			MEDIAN	12.000
MODE	13.000	STD DEV	3.355	VARIANCE	11.255
KURTOSIS	.261			SKEWNESS	-1.022

VALID CASES 25409021

TABLE C-8

NUMERICAL OPERATIONS RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	8410	0	0	17	271590	1	8	34	820087	3	47
1	23373	0	0	18	263925	1	9	35	849822	3	50
2	31759	0	0	19	295833	1	10	36	852309	3	54
3	35763	0	0	20	368710	1	11	37	798705	3	57
4	57439	0	1	21	367169	1	13	38	834946	3	60
5	73781	0	1	22	471118	2	15	39	865821	3	63
6	69468	0	1	23	507316	2	17	40	865662	3	67
7	65991	0	1	24	534894	2	19	41	697060	3	70
8	86010	0	2	25	535852	2	21	42	738470	3	72
9	92697	0	2	26	576152	2	23	43	668582	3	75
10	93271	0	3	27	691986	3	26	44	636020	3	78
11	155771	1	3	28	701082	3	29	45	675694	3	80
12	164895	1	4	29	731493	3	32	46	620378	2	83
13	132977	1	4	30	698862	3	34	47	606519	2	85
14	243015	1	5	31	724793	3	37	48	834563	3	88
15	189779	1	6	32	879611	3	41	49	1352551	5	94
16	182855	1	7	33	758221	3	44	50	1599973	6	100

MEAN	34.498					MEDIAN	35.000
MODE	50.000	STD DEV	10.985			VARIANCE	120.676
KURTOSIS	-0.343					SKEWNESS	-0.508

VALID CASES 25409021

NOTE: Scores not adjusted for nonstandard testing materials. Adjusted scores are shown on the following page.

TABLE C-8 (Continued)

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	31783	0	0	19	271590	1	8	37	758221	3	44
1	31759	0	0	21	263925	1	9	38	820087	3	47
2	35763	0	0	22	295833	1	10	39	1702131	7	54
4	57439	0	1	23	368710	1	11	40	798705	3	57
5	73781	0	1	24	367169	1	13	41	834946	3	60
6	69468	0	1	25	471118	2	15	42	865821	3	63
8	65991	0	1	26	507316	2	17	43	865662	3	67
9	86010	0	2	27	534894	2	19	44	697060	3	70
10	92697	0	2	28	535852	2	21	45	738470	3	72
11	93271	0	3	29	576152	2	23	46	668582	3	75
12	155771	1	3	30	691986	3	26	47	636020	3	78
14	164895	1	4	31	701082	3	29	48	675694	3	80
15	132977	1	4	33	731493	3	32	49	1226897	5	85
16	243015	1	5	34	698862	3	34	50	3793087	15	100
17	189779	1	6	35	724793	3	37				
18	182855	1	7	36	879611	3	41				

MEAN	37.236			MEDIAN	39.000
MODE	50.000	STD DEV	10.800	VARIANCE	116.632
KURTOSIS	.208			SKEWNESS	-0.821

VALID CASES 25409021

NOTE: The first set of scores is based on testing materials used with the 1980 Youth Population; the second set is based on adjusted NO raw scores and is to be used for military testing purposes.

TABLE C-9

CODING SPEED RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	35669	0	0	29	220671	1	15	58	595650	2	77
1	28718	0	0	30	260455	1	16	59	604927	2	80
2	37843	0	0	31	360519	1	18	60	489617	2	82
3	33256	0	1	32	343143	1	19	61	423802	2	83
4	51670	0	1	33	298964	1	20	62	485846	2	85
5	62230	0	1	34	282887	1	21	63	449506	2	87
6	69284	0	1	35	375227	1	23	64	297075	1	88
7	48017	0	1	36	480623	2	25	65	286426	1	89
8	86867	0	2	37	484788	2	27	66	353496	1	91
9	92134	0	2	38	445420	2	28	67	273443	1	92
10	80020	0	2	39	507664	2	30	68	258336	1	93
11	70139	0	3	40	573434	2	33	69	243031	1	94
12	162471	1	3	41	587759	2	35	70	291331	1	95
13	164101	1	4	42	514814	2	37	71	212036	1	96
14	148506	1	5	43	539751	2	39	72	156014	1	96
15	163287	1	5	44	564454	2	41	73	100224	0	97
16	119664	0	6	45	663110	3	44	74	105005	0	97
17	166724	1	6	46	677984	3	47	75	91759	0	98
18	191046	1	7	47	555143	2	49	76	79958	0	98
19	158063	1	8	48	574404	2	51	77	68727	0	98
20	170749	1	8	49	735049	3	54	78	81321	0	99
21	140387	1	9	50	692114	3	57	79	59235	0	99
22	173462	1	10	51	718460	3	60	80	50747	0	99
23	193526	1	10	52	731382	3	62	81	39660	0	99
24	213071	1	11	53	581078	2	65	82	76432	0	99
25	174388	1	12	54	729037	3	68	83	58352	0	100
26	137333	1	12	55	702938	3	70	84	85972	0	100
27	269029	1	14	56	717243	3	73				
28	224803	1	14	57	506120	2	75				

MEAN	46.254			MEDIAN	48.000
MODE	49.000	STD DEV	16.247	VARIANCE	263.967
KURTOSIS	-0.081			SKEWNESS	-0.398

VALID CASES 25409021

NOTE: Scores not adjusted for nonstandard testing materials. Adjusted scores are shown on the following page.

TABLE C-9 (Continued)

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	35669	0	0	29	224803	1	14	58	717243	3	73
1	28718	0	0	30	220671	1	15	59	506120	2	75
2	37843	0	0	31	260455	1	16	60	595650	2	77
3	33256	0	1	32	360519	1	18	61	604927	2	80
4	51670	0	1	33	343143	1	19	62	489617	2	82
5	62230	0	1	34	298964	1	20	63	423802	2	83
6	69284	0	1	35	282887	1	21	64	485846	2	85
7	48017	0	1	36	375227	1	23	65	449506	2	87
8	86867	0	2	37	480623	2	25	66	297075	1	88
9	92134	0	2	38	484788	2	27	67	286426	1	89
10	80020	0	2	39	445420	2	28	68	353496	1	91
11	70139	0	3	40	507664	2	30	69	273443	1	92
12	162471	1	3	41	573434	2	33	70	258336	1	93
13	164101	1	4	42	587759	2	35	71	243031	1	94
14	148506	1	5	43	514814	2	37	72	291331	1	95
15	163287	1	5	44	539751	2	39	73	212036	1	96
16	119664	0	6	45	564454	2	41	74	156014	1	96
17	166724	1	6	46	663110	3	44	75	100224	0	97
18	191046	1	7	47	677984	3	47	76	105005	0	97
20	158063	1	8	48	555143	2	49	77	91759	0	98
21	170749	1	8	49	574404	2	51	78	79958	0	98
22	140387	1	9	50	735049	3	54	79	68727	0	98
23	173462	1	10	51	692114	3	57	80	81321	0	99
24	193526	1	10	53	718460	3	60	81	59235	0	99
25	213071	1	11	54	731382	3	62	82	50747	0	99
26	174388	1	12	55	581078	2	65	83	39660	0	99
27	137333	1	12	56	729037	3	68	84	220757	1	100
28	269029	1	14	57	702938	3	70				

MEAN 47.606
MODE 50.000   STD DEV 16.763
KURTOSIS -0.114

MEDIAN 49.000
VARIANCE 280.992
SKEWNESS -0.413

VALID CASES 25409021

NOTE: The first set of scores is based on testing materials used with the 1980 Youth Population; the second set is based on adjusted CS raw scores and is to be used for military testing purposes.

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TABLE C-10

AUTO/SHOP INFORMATION RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Pct.	Cum pct.
0	45642	.2	.2
1	35949	.1	.3
2	71560	.3	.6
3	156200	.6	1.2
4	297235	1.2	2.4
5	517067	2.0	4.4
6	733687	2.9	7.3
7	1005704	4.0	11.3
8	1112234	4.4	15.6
9	1535607	6.0	21.7
10	1555737	6.1	27.8
11	1657594	6.5	34.3
12	1717943	6.8	41.1
13	1763801	6.9	48.0
14	1487313	5.9	53.9
15	1393848	5.5	59.4
16	1312391	5.2	64.5
17	1233126	4.9	69.4
18	1136515	4.5	73.9
19	1135337	4.5	78.3
20	870621	3.4	81.8
21	1211858	4.8	86.5
22	1123746	4.4	91.0
23	1025648	4.0	95.0
24	846883	3.3	98.3
25	425776	1.7	100.0

MEAN	14.317			MEDIAN	14.000	
MODE	13.000	STD DEV	5.550	VARIANCE	30.801	
KURTOSIS	-0.859			SKEWNESS	.077	

VALID CASES 25409021

TABLE C-11

MATH KNOWLEDGE RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Pct.	Cum pct.
0	66955	.3	.3
1	50075	.2	.5
2	126903	.5	1.0
3	350047	1.4	2.3
4	636399	2.5	4.8
5	952231	3.7	8.6
6	1447093	5.7	14.3
7	1565767	6.2	20.4
8	1603796	6.3	26.8
9	1699831	6.7	33.4
10	1386894	5.5	38.9
11	1403602	5.5	44.4
12	1292848	5.1	49.5
13	1236096	4.9	54.4
14	975389	3.8	58.2
15	815979	3.2	61.4
16	1045702	4.1	65.5
17	822693	3.2	68.8
18	1001156	3.9	72.7
19	1008314	4.0	76.7
20	823548	3.2	79.9
21	935052	3.7	83.6
22	1063472	4.2	87.8
23	984947	3.9	91.7
24	1122464	4.4	96.1
25	991767	3.9	100.0

MEAN	13.578			MEDIAN	13.000
MODE	9.000	STD DEV	6.393	VARIANCE	40.869
KURTOSIS	-1.118			SKEWNESS	.219

VALID CASES 25409021

TABLE C-12

MECHANICAL COMPREHENSION RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Pct.	Cum pct.
0	30073	.1	.1
1	18693	.1	.2
2	37259	.1	.3
3	123522	.5	.8
4	273901	1.1	1.9
5	507398	2.0	3.9
6	809984	3.2	7.1
7	1071923	4.2	11.3
8	1394990	5.5	16.8
9	1436741	5.7	22.5
10	1472405	5.8	28.2
11	1643796	6.5	34.7
12	1642179	6.5	41.2
13	1531686	6.0	47.2
14	1602955	6.3	53.5
15	1436074	5.7	59.2
16	1539976	6.1	65.2
17	1304798	5.1	70.4
18	1330557	5.2	75.6
19	1260111	5.0	80.6
20	1055632	4.2	84.7
21	1239166	4.9	89.6
22	892853	3.5	93.1
23	879020	3.5	96.6
24	570601	2.2	98.8
25	302729	1.2	100.0

MEAN	14.165			MEDIAN	14.000
MODE	11.000	STD DEV	5.349	VARIANCE	28.612
KURTOSIS	-0.867			SKEWNESS	.062

VALID CASES 25409021

TABLE C-13

ELECTRONICS INFORMATION RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Pct.	Cum pct.
0	51081	.2	.2
1	42246	.2	.4
2	140122	.6	.9
3	376878	1.5	2.4
4	633583	2.5	4.9
5	1025357	4.0	8.9
6	1281044	5.0	14.0
7	1417771	5.6	19.6
8	1655016	6.5	26.1
9	1695716	6.7	32.7
10	1901177	7.5	40.2
11	1982307	7.8	48.0
12	2098040	8.3	56.3
13	1951394	7.7	64.0
14	1820332	7.2	71.1
15	2004298	7.9	79.0
16	1898985	7.5	86.5
17	1487022	5.9	92.3
18	1088139	4.3	96.6
19	598302	2.4	99.0
20	260211	1.0	100.0

MEAN	11.569			MEDIAN	12.000
MODE	12.000	STD DEV	4.236	VARIANCE	17.944
KURTOSIS	-0.773			SKEWNESS	-0.163

VALID CASES 25409021

TABLE C-14

VERBAL RAW SCORES FOR TOTAL SAMPLE

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	31571	0	0	18	249168	1	8	35	651771	3	33
2	2434	0	0	19	211275	1	9	36	704979	3	36
3	3559	0	0	20	306952	1	10	37	734324	3	39
4	15787	0	0	21	242732	1	11	38	879244	3	43
5	23087	0	0	22	225419	1	12	39	911589	4	46
6	38114	0	0	23	302166	1	13	40	909402	4	50
7	44547	0	1	24	291163	1	14	41	1016113	4	54
8	75789	0	1	25	391546	2	16	42	1256403	5	59
9	105989	0	1	26	277581	1	17	43	1244270	5	64
10	158033	1	2	27	350139	1	18	44	1374349	5	69
11	119203	0	2	28	425158	2	20	45	1622715	6	75
12	179133	1	3	29	418083	2	22	46	1349765	5	81
13	207503	1	4	30	395856	2	23	47	1531796	6	87
14	181489	1	5	31	372178	1	25	48	1477609	6	92
15	189071	1	5	32	514551	2	27	49	1335386	5	98
16	240469	1	6	33	573011	2	29	50	599971	2	100
17	233896	1	7	34	452683	2	31				

MEAN	37.281			MEDIAN	41.000
MODE	45.000	STD DEV	10.595	VARIANCE	112.244
KURTOSIS	.260			SKEWNESS	-1.036

VALID CASES 25409021

TABLE C-15

GENERAL SCIENCE RAW SCORES FOR MALES

Raw score	Freq	Pct.	Cum pct.
0	13541	.1	.1
1	8381	.1	.2
2	37949	.3	.5
3	49297	.4	.8
4	72398	.6	1.4
5	132414	1.0	2.4
6	182228	1.4	3.8
7	193288	1.5	5.3
8	269789	2.1	7.4
9	390868	3.0	10.5
10	384469	3.0	13.5
11	431891	3.4	16.8
12	497756	3.9	20.7
13	567830	4.4	25.1
14	746767	5.8	30.9
15	787168	6.1	37.0
16	911521	7.1	44.0
17	953266	7.4	51.4
18	959232	7.4	58.9
19	754498	5.9	64.7
20	971053	7.5	72.3
21	779525	6.0	78.3
22	802624	6.2	84.5
23	733355	5.7	90.2
24	667474	5.2	95.4
25	592574	4.6	100.0

MEAN	16.838			MEDIAN	17.000
MODE	20.000	STD DEV	5.229	VARIANCE	27.341
KURTOSIS	-0.361			SKEWNESS	-0.483

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TABLE C-16

ARITHMETIC REASONING RAW SCORES FOR MALES

Raw score	Freq	Pct.	Cum pct.
0	10903	.1	.1
1	11707	.1	.2
2	13437	.1	.3
3	37418	.3	.6
4	82204	.6	1.2
5	124907	1.0	2.2
6	251733	2.0	4.1
7	302886	2.3	6.5
8	430019	3.3	9.8
9	441306	3.4	13.2
10	532766	4.1	17.4
11	428447	3.3	20.7
12	551511	4.3	25.0
13	498852	3.9	28.8
14	474530	3.7	32.5
15	397939	3.1	35.6
16	526310	4.1	39.7
17	381811	3.0	42.7
18	488842	3.8	46.4
19	441166	3.4	49.9
20	436440	3.4	53.3
21	482973	3.7	57.0
22	530123	4.1	61.1
23	469961	3.6	64.8
24	571181	4.4	69.2
25	562140	4.4	73.6
26	616741	4.8	78.3
27	530829	4.1	82.5
28	719280	5.6	88.0
29	701604	5.4	93.5
30	841188	6.5	100.0

MEAN	19.020			MEDIAN	20.000
MODE	30.000	STD DEV	7.528	VARIANCE	56.675
KURTOSIS	-1.163			SKEWNESS	-0.192

VALID CASES 12891155

TABLE C-17

WORD KNOWLEDGE RAW SCORES FOR MALES

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	17789	0	0	12	201769	2	9	24	390868	3	32
1	1262	0	0	13	154268	1	10	25	516892	4	36
2	21437	0	0	14	187211	1	12	26	428656	3	39
3	18639	0	0	15	190906	1	13	27	558174	4	44
4	39663	0	1	16	165988	1	14	28	668004	5	49
5	47958	0	1	17	187825	1	16	29	861033	7	56
6	92970	1	2	18	215979	2	17	30	660280	5	61
7	170669	1	3	19	239831	2	19	31	938883	7	68
8	121992	1	4	20	306181	2	22	32	852356	7	75
9	134501	1	5	21	361983	3	24	33	1052689	8	83
10	119897	1	6	22	317404	2	27	34	1125344	9	92
11	154140	1	7	23	282920	2	29	35	1084796	8	100

```
MEAN        26.227                      MEDIAN      29.000
MODE        34.000    STD DEV   7.913   VARIANCE    62.623
KURTOSIS      .209                      SKEWNESS    -1.030
```

VALID CASES 12891155

TABLE C-18

PARAGRAPH COMPREHENSION RAW SCORES FOR MALES

Raw score	Freq	Pct.	Cum pct.
0	33675	.3	.3
1	79274	.6	.9
2	160726	1.2	2.1
3	255448	2.0	4.1
4	438659	3.4	7.5
5	506303	3.9	11.4
6	506030	3.9	15.4
7	593383	4.6	20.0
8	634371	4.9	24.9
9	706016	5.5	30.4
10	864909	6.7	37.1
11	1264350	9.8	46.9
12	1634839	12.7	59.6
13	2169298	16.8	76.4
14	2080090	16.1	92.5
15	963784	7.5	100.0

MEAN	10.707			MEDIAN	12.000
MODE	13.000	STD DEV	3.478	VARIANCE	12.100
KURTOSIS	-0.121			SKEWNESS	-0.889

VALID CASES 12891155

TABLE C-19

NUMERICAL OPERATIONS RAW SCORES FOR MALES

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	2899	0	0	17	168921	1	9	34	429755	3	51
1	14091	0	0	18	154236	1	10	35	429603	3	54
2	24939	0	0	19	170481	1	12	36	443974	3	58
3	20954	0	0	20	230112	2	13	37	399631	3	61
4	28511	0	1	21	216977	2	15	38	395132	3	64
5	44425	0	1	22	280351	2	17	39	443178	3	67
6	43933	0	1	23	275510	2	19	40	341720	3	70
7	29804	0	2	24	260997	2	21	41	360398	3	73
8	53829	0	2	25	297776	2	24	42	343834	3	75
9	57119	0	2	26	307031	2	26	43	353252	3	78
10	54303	0	3	27	392736	3	29	44	343427	3	81
11	75219	1	3	28	387299	3	32	45	322745	3	83
12	94295	1	4	29	418232	3	35	46	289279	2	85
13	69258	1	5	30	332581	3	38	47	236115	2	87
14	161926	1	6	31	355763	3	41	48	368267	3	90
15	107573	1	7	32	483677	4	45	49	580535	5	95
16	124877	1	8	33	370220	3	47	50	699457	5	100

```
MEAN        33.481                        MEDIAN        34.000
MODE        50.000    STD DEV    11.108    VARIANCE     123.385
KURTOSIS    -0.447                         SKEWNESS      -0.424

VALID CASES 12891155
```

NOTE: Scores not adjusted for nonstandard testing materials. Adjusted scores are shown on the following page.

TABLE C-19 (Continued)

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	16990	0	0	19	168921	1	9	37	370220	3	47
1	24939	0	0	21	154236	1	10	38	429755	3	51
2	20954	0	0	22	170481	1	12	39	873576	7	58
4	28511	0	1	23	230112	2	13	40	399631	3	61
5	44425	0	1	24	216977	2	15	41	395132	3	64
6	43933	0	1	25	280351	2	17	42	443178	3	67
8	29804	0	2	26	275510	2	19	43	341720	3	70
9	53829	0	2	27	260997	2	21	44	360398	3	73
10	57119	0	2	28	297776	2	24	45	343834	3	75
11	54303	0	3	29	307031	2	26	46	353252	3	78
12	75219	1	3	30	392736	3	29	47	343427	3	81
14	94295	1	4	31	387299	3	32	48	322745	3	83
15	69258	1	5	33	418232	3	35	49	525394	4	87
16	161926	1	6	34	332581	3	38	50	1648258	13	100
17	107573	1	7	35	355763	3	41				
18	124877	1	8	36	483677	4	45				

MEAN	36.255			MEDIAN	38.000
MODE	50.000	STD DEV	11.015	VARIANCE	121.340
KURTOSIS	.005			SKEWNESS	-0.725

VALID CASES 12891155

NOTE: The first set of scores is based on testing materials used with the 1980 Youth Population; the second set is based on adjusted NO raw scores and is to be used for military testing purposes.

TABLE C-20

CODING SPEED RAW SCORES FOR MALES

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	22192	0	0	29	158366	1	19	58	263280	2	85
1	19100	0	0	30	173405	1	20	59	218080	2	87
2	21737	0	0	31	234894	2	22	60	215652	2	88
3	17017	0	1	32	231810	2	24	61	160877	1	90
4	23403	0	1	33	205187	2	26	62	180517	1	91
5	32702	0	1	34	194192	2	27	63	100337	1	92
6	36491	0	1	35	223284	2	29	64	93021	1	92
7	28112	0	2	36	282748	2	31	65	76885	1	93
8	47368	0	2	37	268396	2	33	66	135106	1	94
9	59407	0	2	38	300950	2	35	67	114898	1	95
10	51675	0	3	39	303258	2	38	68	94467	1	96
11	46954	0	3	40	344613	3	40	69	95059	1	96
12	120865	1	4	41	395828	3	44	70	91214	1	97
13	98808	1	5	42	300263	2	46	71	76841	1	98
14	97605	1	6	43	310764	2	48	72	45846	0	98
15	118407	1	7	44	310208	2	51	73	16125	0	98
16	81525	1	7	45	358460	3	53	74	28026	0	98
17	108451	1	8	46	377265	3	56	75	30114	0	99
18	99364	1	9	47	307610	2	59	76	20985	0	99
19	86336	1	9	48	295029	2	61	77	24178	0	99
20	97974	1	10	49	377243	3	64	78	10978	0	99
21	83475	1	11	50	337449	3	67	79	21699	0	99
22	114814	1	12	51	356138	3	69	80	22185	0	100
23	120158	1	13	52	308874	2	72	81	6088	0	100
24	140214	1	14	53	309415	2	74	82	15090	0	100
25	125400	1	15	54	304268	2	77	83	21676	0	100
26	81631	1	15	55	293376	2	79	84	21264	0	100
27	170635	1	17	56	339306	3	81				
28	144940	1	18	57	191309	1	83				

```
MEAN        42.932                      MEDIAN      44.000
MODE        41.000    STD DEV   15.745   VARIANCE   247.896
KURTOSIS    -0.169                       SKEWNESS    -0.279

VALID CASES 12891155
```

NOTE: Scores not adjusted for nonstandard testing materials. Adjusted scores are shown on the following page.

TABLE C-20 (Continued)

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	22192	0	0	29	144940	1	18	58	339306	3	81
1	19100	0	0	30	158366	1	19	59	191309	1	83
2	21737	0	0	31	173405	1	20	60	263280	2	85
3	17017	0	1	32	234894	2	22	61	218080	2	87
4	23403	0	1	33	231810	2	24	62	215652	2	88
5	32702	0	1	34	205187	2	26	63	160877	1	90
6	36491	0	1	35	194192	2	27	64	180517	1	91
7	28112	0	2	36	223284	2	29	65	100337	1	92
8	47368	0	2	37	282748	2	31	66	93021	1	92
9	59407	0	2	38	268396	2	33	67	76885	1	93
10	51675	0.	3	39	300950	2	35	68	135106	1	94
11	46954	0	3	40	303258	2	38	69	114898	1	95
12	120865	1	4	41	344613	3	40	70	94467	1	96
13	98808	1	5	42	395828	3	44	71	95059	1	96
14	97605	1	6	43	300263	2	46	72	91214	1	97
15	118407	1	7	44	310764	2	48	73	76841	1	98
16	81525	1	7	45	310208	2	51	74	45846	0	98
17	108451	1	8	46	358460	3	53	75	16125	0	98
18	99364	1	9	47	377265	3	56	76	28026	0	98
20	86336	1	9	48	307610	2	59	77	30114	0	99
21	97974	1	10	49	295029	2	61	78	20985	0	99
22	83475	1	11	50	377243	3	64	79	24178	0	99
23	114814	1	12	51	337449	3	67	80	10978	0	99
24	120158	1	13	53	356138	3	69	81	21699	0	99
25	140214	1	14	54	308874	2	72	82	22185	0	100
26	125400	1	15	55	309415	2	74	83	6088	0	100
27	81631	1	15	56	304268	2	77	84	58030	0	100
28	170635	1	17	57	293376	2	79				

MEAN	44.173			MEDIAN	45.000
MODE	42.000	STD DEV	16.258	VARIANCE	264.311
KURTOSIS	-0.193			SKEWNESS	-0.286

VALID CASES 12891155

NOTE: The first set of scores is based on testing materials used with the 1980 Youth Population; the second set is based on adjusted CS raw scores and is to be used for military testing purposes.

TABLE C-21

AUTO / SHOP INFORMATION RAW SCORES FOR MALES

Raw score	Freq	Pct.	Cum pct.
0	15137	.1	.1
1	14764	.1	.2
2	24966	.2	.4
3	71632	.6	1.0
4	83398	.6	1.6
5	159208	1.2	2.9
6	199737	1.5	4.4
7	286859	2.2	6.6
8	263985	2.0	8.7
9	349406	2.7	11.4
10	387323	3.0	14.4
11	416272	3.2	17.6
12	434707	3.4	21.0
13	487907	3.8	24.8
14	484972	3.8	28.5
15	645307	5.0	33.6
16	621674	4.8	38.4
17	844438	6.6	44.9
18	839599	6.5	51.4
19	961920	7.5	58.9
20	783395	6.1	65.0
21	1137254	8.8	73.8
22	1097733	8.5	82.3
23	1012557	7.9	90.2
24	846777	6.6	96.7
25	420229	3.3	100.0

MEAN	17.210			MEDIAN	18.000
MODE	21.000	STD DEV	5.453	VARIANCE	29.732
KURTOSIS	-0.367			SKEWNESS	-0.671

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TABLE C-22

MATH KNOWLEDGE RAW SCORES FOR MALES

Raw score	Freq	Pct.	Cum pct.
0	32041	.2	.2
1	18122	.1	.4
2	68506	.5	.9
3	164887	1.3	2.2
4	302774	2.3	4.5
5	476482	3.7	8.2
6	674898	5.2	13.5
7	838577	6.5	20.0
8	768105	6.0	25.9
9	765796	5.9	31.9
10	675356	5.2	37.1
11	718746	5.6	42.7
12	625343	4.9	47.5
13	549579	4.3	51.8
14	500830	3.9	55.7
15	395482	3.1	58.8
16	569653	4.4	63.2
17	355729	2.8	65.9
18	489541	3.8	69.7
19	457972	3.6	73.3
20	404329	3.1	76.4
21	477366	3.7	80.1
22	511554	4.0	84.1
23	616309	4.8	88.9
24	750751	5.8	94.7
25	682428	5.3	100.0

MEAN	14.021			MEDIAN	13.000
MODE	7.000	STD DEV	6.608	VARIANCE	43.661
KURTOSIS	-1.212			SKEWNESS	.164

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TABLE C-23

MECHANICAL COMPREHENSION RAW SCORES FOR MALES

Raw score	Freq	Pct.	Cum pct.
0	13804	.1	.1
1	11176	.1	.2
2	13806	.1	.3
3	53974	.4	.7
4	92926	.7	1.4
5	162344	1.3	2.7
6	254993	2.0	4.7
7	358847	2.8	7.5
8	409126	3.2	10.6
9	489355	3.8	14.4
10	443857	3.4	17.9
11	564010	4.4	22.2
12	600285	4.7	26.9
13	674520	5.2	32.1
14	711474	5.5	37.7
15	548288	4.3	41.9
16	738334	5.7	47.6
17	777347	6.0	53.7
18	836685	6.5	60.2
19	863432	6.7	66.9
20	788943	6.1	73.0
21	1043464	8.1	81.1
22	787201	6.1	87.2
23	827706	6.4	93.6
24	529150	4.1	97.7
25	296111	2.3	100.0

MEAN	16.177			MEDIAN	17.000
MODE	21.000	STD DEV	5.442	VARIANCE	29.611
KURTOSIS	-0.762			SKEWNESS	-0.386

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TABLE C-24

ELECTRONICS INFORMATION RAW SCORES FOR MALES

Raw score	Freq	Pct.	Cum pct.
0	26583	.2	.2
1	20726	.2	.4
2	64763	.5	.9
3	125583	1.0	1.8
4	204959	1.6	3.4
5	364942	2.8	6.3
6	382339	3.0	9.2
7	495557	3.8	13.1
8	501400	3.9	17.0
9	535367	4.2	21.1
10	674332	5.2	26.3
11	753243	5.8	32.2
12	869077	6.7	38.9
13	886326	6.9	45.8
14	1123419	8.7	54.5
15	1358548	10.5	65.1
16	1502154	11.7	76.7
17	1217402	9.4	86.2
18	974437	7.6	93.7
19	557792	4.3	98.0
20	252205	2.0	100.0

MEAN	13.091			MEDIAN	14.000
MODE	16.000	STD DEV	4.240	VARIANCE	17.974
KURTOSIS	-0.379			SKEWNESS	-0.618

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TABLE C-25

VERBAL RAW SCORES FOR MALES

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	14925	0	0	18	147795	1	10	35	329954	3	35
2	1262	0	0	19	115892	1	10	36	309287	2	37
3	1412	0	0	20	186088	1	12	37	384933	3	40
4	10914	0	0	21	117981	1	13	38	447153	3	43
5	10252	0	0	22	88509	1	13	39	434982	3	47
6	25744	0	1	23	152617	1	15	40	469259	4	50
7	34027	0	1	24	139662	1	16	41	486320	4	54
8	46497	0	1	25	189794	1	17	42	628125	5	59
9	63987	0	2	26	139777	1	18	43	606633	5	64
10	101103	1	2	27	173621	1	20	44	707048	5	69
11	74663	1	3	28	219236	2	21	45	825471	6	76
12	100582	1	4	29	215753	2	23	46	647258	5	81
13	111942	1	5	30	185987	1	24	47	819102	6	87
14	103817	1	5	31	189614	1	26	48	712079	6	93
15	123279	1	6	32	266244	2	28	49	682893	5	98
16	119455	1	7	33	274917	2	30	50	281064	2	100
17	137746	1	8	34	234504	2	32				

```
MEAN        36.934                      MEDIAN      40.000
MODE        45.000    STD DEV  10.938   VARIANCE   119.634
KURTOSIS      .108                      SKEWNESS    -1.008

VALID CASES 12891155
```

TABLE C-26

GENERAL SCIENCE RAW SCORES FOR FEMALES

Raw score	Freq	Pct.	Cum pct.
0	18457	.1	.1
1	15583	.1	.3
2	29474	.2	.5
3	37420	.3	.8
4	58546	.5	1.3
5	127562	1.0	2.3
6	260385	2.1	4.4
7	246035	2.0	6.3
8	336727	2.7	9.0
9	399850	3.2	12.2
10	548572	4.4	16.6
11	645243	5.2	21.8
12	786388	6.3	28.0
13	957583	7.6	35.7
14	1138116	9.1	44.8
15	956603	7.6	52.4
16	953669	7.6	60.0
17	991857	7.9	68.0
18	955275	7.6	75.6
19	763125	6.1	81.7
20	759601	6.1	87.8
21	631937	5.0	92.8
22	414590	3.3	96.1
23	277307	2.2	98.3
24	144760	1.2	99.5
25	63199	.5	100.0

MEAN	15.036			MEDIAN	15.000
MODE	14.000	STD DEV	4.599	VARIANCE	21.153
KURTOSIS	-0.276			SKEWNESS	-0.294

VALID CASES 12517866

TABLE C-27

ARITHMETIC REASONING RAW SCORES FOR FEMALES

Raw score	Freq	Pct.	Cum pct.
0	17004	.1	.1
1	1620	.0	.1
2	6586	.1	.2
3	33305	.3	.5
4	89699	.7	1.2
5	153298	1.2	2.4
6	293274	2.3	4.8
7	405662	3.2	8.0
8	508079	4.1	12.1
9	653459	5.2	17.3
10	631483	5.0	22.3
11	626216	5.0	27.3
12	673282	5.4	32.7
13	508773	4.1	36.8
14	579656	4.6	41.4
15	539292	4.3	45.7
16	585000	4.7	50.4
17	500499	4.0	54.4
18	574304	4.6	59.0
19	526496	4.2	63.2
20	506253	4.0	67.2
21	416753	3.3	70.5
22	412931	3.3	73.8
23	373797	3.0	76.8
24	511162	4.1	80.9
25	462977	3.7	84.6
26	342573	2.7	87.3
27	443029	3.5	90.9
28	409056	3.3	94.1
29	385989	3.1	97.2
30	346359	2.8	100.0

MEAN	16.968				MEDIAN	16.000
MODE	12.000	STD DEV	7.061		VARIANCE	49.851
KURTOSIS	-1.044				SKEWNESS	.150

VALID CASES 12517866

TABLE C-28

WORD KNOWLEDGE RAW SCORES FOR FEMALES

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	17767	0	0	12	130522	1	6	24	379400	3	33
1	6045	0	0	13	185323	1	8	25	504897	4	37
2	7897	0	0	14	161312	1	9	26	490806	4	41
3	6198	0	0	15	223727	2	11	27	576550	5	46
4	35130	0	1	16	219498	2	13	28	618404	5	50
5	32246	0	1	17	253224	2	15	29	712001	6	56
6	50309	0	1	18	296975	2	17	30	797443	6	63
7	115240	1	2	19	267654	2	19	31	718448	6	68
8	74343	1	3	20	210609	2	21	32	968585	8	76
9	92995	1	4	21	336103	3	24	33	1041656	8	84
10	136223	1	5	22	365035	3	27	34	957399	8	92
11	106459	1	5	23	420521	3	30	35	1000922	8	100

MEAN	26.314			MEDIAN	28.000
MODE	33.000	STD DEV	7.494	VARIANCE	56.158
KURTOSIS	.204			SKEWNESS	-0.966

VALID CASES 12517866

TABLE C-29

PARAGRAPH COMPREHENSION RAW SCORES FOR FEMALES

Raw score	Freq	Pct.	Cum pct.
0	34517	.3	.3
1	31726	.3	.5
2	120094	1.0	1.5
3	184053	1.5	3.0
4	285607	2.3	5.2
5	293021	2.3	7.6
6	371080	3.0	10.5
7	436157	3.5	14.0
8	507111	4.1	18.1
9	594571	4.7	22.8
10	770651	6.2	29.0
11	1357858	10.8	39.8
12	1716178	13.7	53.5
13	2340292	18.7	72.2
14	2163309	17.3	89.5
15	1311640	10.5	100.0

MEAN	11.323			MEDIAN	12.000
MODE	13.000	STD DEV	3.193	VARIANCE	10.193
KURTOSIS	.775			SKEWNESS	-1.167

VALID CASES 12517866

TABLE C-30

NUMERICAL OPERATIONS RAW SCORES FOR FEMALES

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	5511	0	0	17	102669	1	6	34	390332	3	43
1	9282	0	0	18	109689	1	7	35	420220	3	46
2	6819	0	0	19	125352	1	8	36	408335	3	49
3	14809	0	0	20	138598	1	9	37	399074	3	53
4	28929	0	1	21	150192	1	11	38	439815	4	56
5	29356	0	1	22	190767	2	12	39	422643	3	60
6	25535	0	1	23	231806	2	14	40	523942	4	64
7	36187	0	1	24	273897	2	16	41	336662	3	66
8	32181	0	2	25	238077	2	18	42	394636	3	70
9	35578	0	2	26	269121	2	20	43	315330	3	72
10	38967	0	2	27	299250	2	23	44	292593	2	74
11	80552	1	3	28	313783	3	25	45	352949	3	77
12	70600	1	3	29	313261	3	28	46	331099	3	80
13	63719	1	4	30	366281	3	31	47	370404	3	83
14	81089	1	4	31	369030	3	33	48	466296	4	87
15	82206	1	5	32	395935	3	37	49	778017	6	93
16	57978	0	6	33	388001	3	40	50	900516	7	100

```
MEAN        35.546                          MEDIAN        37.000
MODE        50.000    STD DEV    10.758      VARIANCE     115.724
KURTOSIS    -0.188                           SKEWNESS      -0.599

VALID CASES 12517866
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NOTE: Scores not adjusted for nonstandard testing materials. Adjusted scores are shown on the following page.

TABLE C-30 (Continued)

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	14793	0	0	19	102669	1	6	37	388001	3	40
1	6819	0	0	21	109689	1	7	38	390332	3	43
2	14809	0	0	22	125352	1	8	39	828555	7	49
4	28929	0	1	23	138598	1	9	40	399074	3	53
5	29356	0	1	24	150192	1	11	41	439815	4	56
6	25535	0	1	25	190767	2	12	42	422643	3	60
8	36187	0	1	26	231806	2	14	43	523942	4	64
9	32181	0	2	27	273897	2	16	44	336662	3	66
10	35578	0	2	28	238077	2	18	45	394636	3	70
11	38967	0	2	29	269121	2	20	46	315330	3	72
12	80552	1	3	30	299250	2	23	47	292593	2	74
14	70600	1	3	31	313783	3	25	48	352949	3	77
15	63719	1	4	33	313261	3	28	49	701503	6	83
16	81089	1	4	34	366281	3	31	50	2144829	17	100
17	82206	1	5	35	369030	3	33				
18	57978	0	6	36	395935	3	37				

MEAN	38.246			MEDIAN	40.000
MODE	50.000	STD DEV	10.477	VARIANCE	109.772
KURTOSIS	.487			SKEWNESS	-0.928

VALID CASES 12517866

NOTE: The first set of scores is based on testing materials used with the 1980 Youth Population; the second set is based on adjusted NO raw scores and is to be used for military testing purposes.

TABLE C-31

CODING SPEED RAW SCORES FOR FEMALES

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	13477	0	0	29	62305	0	11	58	332369	3	70
1	9618	0	0	30	87050	1	12	59	386847	3	73
2	16106	0	0	31	125625	1	13	60	273965	2	75
3	16239	0	0	32	111333	1	14	61	262925	2	77
4	28266	0	1	33	93777	1	15	62	305329	2	80
5	29527	0	1	34	88695	1	15	63	349169	3	82
6	32793	0	1	35	151943	1	17	64	204054	2	84
7	19905	0	1	36	197874	2	18	65	209541	2	86
8	39499	0	2	37	216392	2	20	66	218390	2	87
9	32727	0	2	38	144470	1	21	67	158545	1	89
10	28345	0	2	39	204405	2	23	68	163869	1	90
11	23185	0	2	40	228820	2	25	69	147972	1	91
12	41607	0	3	41	191932	2	26	70	200117	2	93
13	65293	1	3	42	214551	2	28	71	135194	1	94
14	50902	0	4	43	228987	2	30	72	110168	1	95
15	44880	0	4	44	254246	2	32	73	84099	1	95
16	38140	0	4	45	304651	2	34	74	76979	1	96
17	58273	0	5	46	300719	2	37	75	61645	0	97
18	91681	1	5	47	247533	2	39	76	58974	0	97
19	71727	1	6	48	279376	2	41	77	44549	0	97
20	72775	1	7	49	357806	3	44	78	70343	1	98
21	56912	0	7	50	354666	3	46	79	37536	0	98
22	58648	0	8	51	362321	3	49	80	28562	0	98
23	73368	1	8	52	422508	3	53	81	33572	0	99
24	72858	1	9	53	271662	2	55	82	61342	0	99
25	48988	0	9	54	424768	3	58	83	36677	0	99
26	55702	0	10	55	409563	3	62	84	64708	1	100
27	98394	1	10	56	377937	3	65				
28	79863	1	11	57	314812	3	67				

MEAN 49.674   MEDIAN 52.000
MODE 54.000   STD DEV 16.046   VARIANCE 257.459
KURTOSIS .274   SKEWNESS -0.591

VALID CASES 12517866

NOTE: Scores not adjusted for nonstandard testing materials. Adjusted scores are shown on the following page.

TABLE C-31 (Continued)

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	13477	0	0	29	79863	1	11	58	377937	3	65
1	9618	0	0	30	62305	0	11	59	314812	3	67
2	16106	0	0	31	87050	1	12	60	332369	3	70
3	16239	0	0	32	125625	1	13	61	386847	3	73
4	28266	0	1	33	111333	1	14	62	273965	2	75
5	29527	0	1	34	93777	1	15	63	262925	2	77
6	32793	0	1	35	88695	1	15	64	305329	2	80
7	19905	0	1	36	151943	1	17	65	349169	3	82
8	39499	0	2	37	197874	2	18	66	204054	2	84
9	32727	0	2	38	216392	2	20	67	209541	2	86
10	28345	0	2	39	144470	1	21	68	218390	2	87
11	23185	0	2	40	204405	2	23	69	158545	1	89
12	41607	0	3	41	228820	2	25	70	163869	1	90
13	65293	1	3	42	191932	2	26	71	147972	1	91
14	50902	0	4	43	214551	2	28	72	200117	2	93
15	44880	0	4	44	228987	2	30	73	135194	1	94
16	38140	0	4	45	254246	2	32	74	110168	1	95
17	58273	0	5	46	304651	2	34	75	84099	1	95
18	91681	1	5	47	300719	2	37	76	76979	1	96
20	71727	1	·6	48	247533	2	39	77	61645	0	97
21	72775	1	7	49	279376	2	41	78	58974	0	97
22	56912	0	7	50	357806	3	44	79	44549	0	97
23	58648	0	8	51	354666	3	46	80	70343	1	98
24	73368	1	8	53	362321	3	49	81	37536	0	98
25	72858	1	9	54	422508	3	53	82	28562	0	98
26	48988	0	9	55	271662	2	55	83	33572	0	99
27	55702	0	10	56	424768	3	58	84	162727	1	100
28	98394	1	10	57	409563	3	62				

MEAN	51.142			MEDIAN	54.000	
MODE	56.000	STD DEV	16.539	VARIANCE	273.535	
KURTOSIS	.242			SKEWNESS	-0.616	

VALID CASES 12517866

NOTE: The first set of scores is based on testing materials used with the 1980 Youth Population; the second set is based on adjusted CS raw scores and is to be used for military testing purposes.

TABLE C-32

AUTO / SHOP INFORMATION RAW SCORES FOR FEMALES

Raw score	Freq	Pct.	Cum pct.
0	30505	.2	.2
1	21185	.2	.4
2	46594	.4	.8
3	84567	.7	1.5
4	213837	1.7	3.2
5	357860	2.9	6.0
6	533950	4.3	10.3
7	718845	5.7	16.0
8	848250	6.8	22.8
9	1186201	9.5	32.3
10	1168414	9.3	41.6
11	1241322	9.9	51.5
12	1283236	10.3	61.8
13	1275893	10.2	72.0
14	1002341	8.0	80.0
15	748542	6.0	86.0
16	690717	5.5	91.5
17	388688	3.1	94.6
18	296916	2.4	97.0
19	173417	1.4	98.3
20	87226	.7	99.0
21	74604	.6	99.6
22	26013	.2	99.9
23	13092	.1	100.0
24	106	.0	100.0
25	5547	.0	100.0

MEAN	11.337			MEDIAN	11.000
MODE	12.000	STD DEV	3.795	VARIANCE	14.402
KURTOSIS	-0.089			SKEWNESS	.057

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TABLE C-33

MATH KNOWLEDGE RAW SCORES FOR FEMALES

Raw score	Freq	Pct.	Cum pct.
0	34914	.3	.3
1	31953	.3	.5
2	58397	.5	1.0
3	185160	1.5	2.5
4	333625	2.7	5.1
5	475749	3.8	8.9
6	772195	6.2	15.1
7	727190	5.8	20.9
8	835691	6.7	27.6
9	934036	7.5	35.1
10	711538	5.7	40.7
11	684856	5.5	46.2
12	667504	5.3	51.5
13	686516	5.5	57.0
14	474559	3.8	60.8
15	420497	3.4	64.2
16	476049	3.8	68.0
17	466963	3.7	71.7
18	511615	4.1	75.8
19	550342	4.4	80.2
20	419219	3.3	83.5
21	457686	3.7	87.2
22	551918	4.4	91.6
23	368638	2.9	94.6
24	371714	3.0	97.5
25	309340	2.5	100.0

MEAN	13.122			MEDIAN	12.000
MODE	9.000	STD DEV	6.131	VARIANCE	37.584
KURTOSIS	-1.022			SKEWNESS	.257

VALID CASES 12517866

TABLE C-34

MECHANICAL COMPREHENSION RAW SCORES FOR FEMALES

Raw score	Freq	Pct.	Cum pct.
0	16269	.1	.1
1	7517	.1	.2
2	23454	.2	.4
3	69548	.6	.9
4	180975	1.4	2.4
5	345054	2.8	5.1
6	554991	4.4	9.6
7	713076	5.7	15.3
8	985864	7.9	23.1
9	947386	7.6	30.7
10	1028549	8.2	38.9
11	1079786	8.6	47.6
12	1041893	8.3	55.9
13	857166	6.8	62.7
14	891482	7.1	69.8
15	887785	7.1	76.9
16	801643	6.4	83.3
17	527451	4.2	87.6
18	493873	3.9	91.5
19	396679	3.2	94.7
20	266689	2.1	96.8
21	195702	1.6	98.4
22	105652	.8	99.2
23	51315	.4	99.6
24	41451	.3	99.9
25	6618	.1	100.0

MEAN	12.093			MEDIAN	12.000
MODE	11.000	STD DEV	4.373	VARIANCE	19.120
KURTOSIS	-0.472			SKEWNESS	.224

VALID CASES 12517866

TABLE C-35

ELECTRONICS INFORMATION RAW SCORES FOR FEMALES

Raw score	Freq	Pct.	Cum pct.
0	24498	.2	.2
1	21520	.2	.4
2	75359	.6	1.0
3	251294	2.0	3.0
4	428624	3.4	6.4
5	660415	5.3	11.7
6	898706	7.2	18.9
7	922215	7.4	26.2
8	1153616	9.2	35.4
9	1160349	9.3	44.7
10	1226845	9.8	54.5
11	1229064	9.8	64.3
12	1228963	9.8	74.1
13	1065068	8.5	82.7
14	696913	5.6	88.2
15	645750	5.2	93.4
16	396832	3.2	96.6
17	269620	2.2	98.7
18	113702	.9	99.6
19	40510	.3	99.9
20	8005	.1	100.0

MEAN	10.001			MEDIAN	10.000
MODE	11.000	STD DEV	3.615	VARIANCE	13.070
KURTOSIS	-0.543			SKEWNESS	.009

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TABLE C-36

VERBAL RAW SCORES FOR FEMALES

Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct	Raw score	Freq	Pct	Cum pct
0	16647	0	0	18	101373	1	7	35	321817	3	32
2	1172	0	0	19	95383	1	8	36	395692	3	36
3	2147	0	0	20	120863	1	9	37	349391	3	38
4	4873	0	0	21	124751	1	10	38	432091	3	42
5	12835	0	0	22	136910	1	11	39	476607	4	46
6	12370	0	0	23	149550	1	12	40	440143	4	49
7	10520	0	0	24	151501	1	13	41	529793	4	53
8	29292	0	1	25	201751	2	15	42	628279	5	58
9	42002	0	1	26	137804	1	16	43	637637	5	63
10	56930	0	2	27	176518	1	17	44	667301	5	69
11	44540	0	2	28	205922	2	19	45	797244	6	75
12	78551	1	2	29	202330	2	21	46	662507	5	80
13	95562	1	3	30	209870	2	22	47	712694	6	86
14	77672	1	4	31	182564	1	24	48	765531	6	92
15	65792	1	4	32	248307	2	26	49	652493	5	97
16	121013	1	5	33	298094	2	28	50	318908	3	100
17	96150	1	6	34	218179	2	30				

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MEAN        37.637                          MEDIAN       41.000
MODE        45.000    STD DEV    10.217      VARIANCE    104.383
KURTOSIS      .406                           SKEWNESS     -1.056

VALID CASES 12517866
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ANNEX C-1

SMOOTHED FREQUENCY DISTRIBUTIONS OF THE AFQT
IN THE 1980 YOUTH POPULATION

TABLE C-37

AFQT 8A CUMULATIVE PROPORTION FOR HALF-POINT RAW SCORE VALUES IN 1980 YOUTH POPULATION AFTER ADJUSTMENT FOR NUMERICAL OPERATIONS SUBTEST

Raw Score	Cumulative Proportion[a]	Raw Score	Cumulative Proportion	Raw Score	Cumulative Proportion[a]	Raw Score	Cumulative Proportion
.0	.000054	30.0	.035757	56.0	.207313	82.0	.581737
.5	.000108	30.5	.037807	56.5	.212271	82.5	.592756
1.0	.000162	31.0	.039856	57.0	.217231	83.0	.604044
2.0	.000214	31.5	.041906	57.5	.222207	83.5	.615468
2.5	.000260	32.0	.044005	58.0	.227206	84.0	.626892
3.0	.000303	32.5	.046201	58.5	.232216	84.5	.638109
4.0	.000347	33.0	.048447	59.0	.237226	85.0	.648912
5.0	.000387	33.5	.050692	59.5	.242235	85.5	.659423
5.5	.000423	34.0	.052937	60.0	.247245	86.0	.669761
6.0	.000465	34.5	.055199	60.5	.252255	86.5	.680013
7.0	.000523	35.0	.057512	61.0	.257265	87.0	.690265
7.5	.000604	35.5	.059879	61.5	.262263	87.5	.700517
8.0	.000722	36.0	.062264	62.0	.267210	88.0	.710769
8.5	.000856	36.5	.064652	62.5	.272093	88.5	.721125
9.0	.000991	37.0	.067114	63.0	.276948	89.0	.731772
9.5	.001126	37.5	.069715	63.5	.282383	89.5	.742687
11.5	.001261	38.0	.072383	64.0	.288977	90.0	.753682
12.0	.001396	38.5	.075052	64.5	.296172	90.5	.764360
12.5	.001531	39.0	.077932	65.0	.303360	91.0	.774403
13.0	.001666	39.5	.081234	65.5	.310467	91.5	.784127
14.0	.001832	40.0	.084748	66.0	.317522	92.0	.793852
14.5	.002057	40.5	.088251	66.5	.324656	92.5	.803561
15.0	.002299	41.0	.091730	67.0	.331947	93.0	.813226
15.5	.002507	41.5	.095184	67.5	.339317	93.5	.822784
16.0	.002717	42.0	.098573	68.0	.346687	94.0	.832201
16.5	.003051	42.5	.101875	68.5	.353969	94.5	.841555
17.0	.003576	43.0	.105140	69.0	.361078	95.0	.850909
17.5	.004208	43.5	.108406	69.5	.368099	95.5	.860262
18.0	.004891	44.0	.111722	70.0	.375329	96.0	.869616
18.5	.005655	44.5	.115136	70.5	.383118	96.5	.878970
19.0	.006484	45.0	.118600	71.0	.391400	97.0	.888324
19.5	.007328	45.5	.122065	71.5	.399825	97.5	.897677
20.0	.008173	46.0	.125594	72.0	.408249	98.0	.907031
20.5	.009018	46.5	.129253	72.5	.416674	98.5	.916385
21.0	.009862	47.0	.132977	73.0	.424993	99.0	.925738
21.5	.010706	47.5	.136701	73.5	.433102	99.5	.935082
22.0	.011548	48.0	.140425	74.0	.441105	100.0	.944406
22.5	.012387	48.5	.144149	74.5	.449065	100.5	.953368
23.0	.013328	49.0	.147873	75.0	.456734	101.0	.961382
23.5	.014482	49.5	.151542	75.5	.463951	101.5	.968552
24.0	.015790	50.0	.155083	76.0	.470963	102.0	.975474
24.5	.017191	50.5	.158123	76.5	.478123	102.5	.981828
25.0	.018638	51.0	.161971	77.0	.485580	103.0	.986824
25.5	.020132	51.5	.165446	77.5	.493392	103.5	.990634
26.0	.021720	52.0	.169228	78.0	.501810	104.0	.993873
26.5	.023356	52.5	.173593	78.5	.510820	104.5	.996936
27.0	.024991	53.0	.178250	79.0	.520070	105.0	1.000000
27.5	.026626	53.5	.182906	79.5	.529605		
28.0	.028261	54.0	.187631	80.0	.539579		
28.5	.029964	54.5	.192493	80.5	.549761		
29.0	.031802	55.0	.197424	81.0	.560135		
29.5	.033743	55.5	.202361	81.5	.570853		

SOURCE: Air Force Human Resources Laboratory, TP-85-21, *Armed Services Vocational Aptitude Battery: Equating and Implementation of Forms 11, 12, and 13 in the 1980 Youth Population Metric,* by Malcolm J. Ree, John R. Welsh, Toni G. Wegner, and James A. Earles, Unclassified, Nov 1985.
a. Cumulative proportion after smoothing raw frequency with S3RSSH.

TABLE C-38

CUMULATIVE SMOOTHED[a] PERCENTILES FOR WEIGHTED 1980 YOUTH POPULATION MALES

Score	Unsmoothed Frequency	Cumm % of Smoothed	Score	Unsmoothed Frequency	Cumm % of Smoothed
0.0			26.0	20,351	02.6296
0.5			26.5	11,461	02.7955
1.0			27.0	22,296	02.9734
1.5			27.5	46,281	03.1590
2.0	1,749	00.0097	28.0	19,101	03.3486
2.5			28.5	15,811	03.5336
3.0			29.0	37,594	03.7094
3.5			29.5	53,680	03.8806
4.0	519	00.0195	30.0	22,418	04.0595
4.5			30.5	21,928	04.2537
5.0			31.0	36,591	·04.4630
5.5			31.5	26,248	04.6874
6.0	1,847	00.0292	32.0	45,306	04.9192
6.5			32.5	29,058	05.1511
7.0	1,221	00.0390	33.0	25,671	05.3867
7.5	1,049	00.0487	33.5	7,968	05.6295
8.0	4,476	00.0623	34.0	30,895	05.8760
8.5	3,290	00.0835	34.5	32,843	06.1265
9.0	3,138	00.1085	35.0	25,212	06.3871
9.5	1,781	00.1336	35.5	36,254	06.6567
10.0			36.0	38,436	06.9287
10.5			36.5	34,091	07.2007
11.0			37.0	24,622	07.4646
11.5	7,344	00.1613	37.5	45,049	07.7119
12.0			38.0	24,770	07.9511
12.5	902	00.1943	38.5	30,258	08.1934
13.0	1,180	00.2300	39.0	31,411	08.4432
13.5			39.5	59,543	08.7324
14.0	7,630	00.2656	40.0	32,075	09.0987
14.5	4,470	00.3013	40.5	56,788	09.5156
15.0	6,122	00.3370	41.0	48,919	09.9412
15.5	3,200	00.3726	41.5	53,329	10.3667
16.0	2,433	00.4183	42.0	58,745	10.7923
16.5	5,912	00.4896	42.5	21,823	11.1844
17.0	13,123	00.5851	43.0	31,171	11.5098
17.5	13,392	00.6920	43.5	60,640	11.8017
18.0	25,389	00.7945	44.0	37,821	12.1084
18.5	4,074	00.8829	44.5	42,766	12.447
19.0	10,191	00.9642	45.0	35,411	12.7959
19.5	5,010	01.0456	45.5	65,088	13.1470
20.0	14,269	01.1267	46.0	50,862	13.4981
20.5	12,895	01.2073	46.5	41,351	13.8546
21.0	10,196	01.2883	47.0	25,797	14.2218
21.5	8,271	01.3703	47.5	32,241	14.5953
22.0	11,336	01.4545	48.0	46,687	14.9668
22.5	10,447	01.5571	48.5	58,793	15.3513
23.0	32,487	01.6960	49.0	33,008	15.7598
23.5	18,631	01.8597	49.5	52,681	16.1801
24.0	21,138	02.0284	50.0	58,712	16.5901
24.5	25,373	02.1902	50.5	29,819	17.3578
25.0	15,642	02.3385			
25.5	17,728	02.4800			

TABLE C-38 (Continued)

Score	Unsmoothed Frequency	Cumm % of Smoothed	Score	Unsmoothed Frequency	Cumm % of Smoothed
51.0	29,819	17.3578	78.0	91,312	48.9992
51.5	47,452	17.7364	78.5	99,584	49.7939
52.0	45,223	18.1450	79.0	87,706	50.6156
52.5	59,428	18.6132	79.5	119,870	51.4915
53.0	65,074	19.1195	80.0	113,167	52.4058
53.5	100,057	19.6354	80.5	124,040	53.3427
54.0	58,936	20.1460	81.0	91,022	54.2909
54.5	48,857	20.6499	81.5	148,688	55.2391
55.0	65,008	21.1539	82.0	118,828	56.1873
55.5	63,524	21.6615	82.5	100,314	57.1355
56.0	70,658	22.1796	83.0	143,715	58.0837
56.5	55,575	22.7075	83.5	117,845	59.0319
57.0	82,775	23.2385	84.0	154,309	59.9801
57.5	66,540	23.7694	84.5	85,734	60.9348
58.0	37,439	24.2993	85.0	199,094	61.9023
58.5	77,591	24.8179	85.5	111,645	62.8790
59.0	32,083	25.3171	86.0	142,332	63.8613
59.5	66,006	25.8072	86.5	86,966	64.8463
60.0	57,958	26.2973	87.0	123,453	65.8314
60.5	61,579	26.7886	87.5	122,056	66.8164
61.0	62,240	27.2830	88.0	123,445	67.8014
61.5	79,937	27.7873	88.5	121,947	68.7865
62.0	59,415	28.3080	89.0	187,773	69.8247
62.5	66,251	28.8366	89.5	170,375	70.9693
63.0	71,063	29.3653	90.0	150,109	72.1671
63.5	39,289	29.8829	90.5	138,610	73.3696
64.0	60,004	30.3769	91.0	117,854	74.5815
64.5	60,709	30.8572	91.5	152,466	75.7982
65.0	94,220	31.3374	92.0	187,994	77.0148
65.5	53,091	31.8467	92.5	114,926	78.2314
66.0	34,960	32.4102	93.0	197,100	79.3818
66.5	74,151	33.0000	93.5	94,688	80.3999
67.0	73,914	33.5898	94.0	184,704	81.3517
67.5	122,517	34.1801	94.5	110,816	82.3036
68.0	65,676	34.7836	95.0	119,287	83.2554
68.5	80,326	35.4123	95.5	115,322	84.2073
69.0	68,595	36.0637	96.0	129,806	85.1801
69.5	100,003	36.7359	96.5	79,975	86.2267
70.0	85,555	37.4474	97.0	165,705	87.3576
70.5	118,511	38.2192	97.5	145,698	88.5202
71.0	76,038	39.0249	98.0	179,610	89.6829
71.5	115,267	39.8332	98.5	76,394	90.8379
72.0	101,294	40.6415	99.0	196,324	91.9780
72.5	114,553	41.4497	99.5	107,554	93.0899
73.0	91,125	42.2561	100.0	141,941	94.1602
73.5	109,702	43.0588	100.5	91,325	95.1771
74.0	83,922	43.8411	101.0	170,026	96.0966
74.5	100,350	44.5723	101.5	63,605	96.0966
75.0	64,221	45.2235	102.0	131,531	97.6784
75.5	117,791	45.7947	102.5	62,205	98.3171
76.0	50,889	46.3331	103.0	146,605	98.8100
76.5	67,473	46.8715	103.5	17,766	99.2364
77.0	117,273	47.4740	104.0	115,134	99.6378
77.5	141,105	48.2048	104.5		
			105.0	45,394	100.0000

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a. S3RSSH

TABLE C-39

CUMULATIVE SMOOTHED[a] PERCENTILES FOR WEIGHTED
1980 YOUTH POPULATION FEMALES

Score	Unsmoothed Frequency	Cumm % of Smoothed	Score	Unsmoothed Frequency	Cumm % of Smoothed
0.0	3,190	00.0106	26.0	19,615	01.7315
0.5	1,319	00.0212	26.5	11,010	01.8730
1.0	1,264	00.0317	27.0	17,617	02.0144
1.5			27.5	23,809	02.1559
2.0			28.0	11,043	02.2974
2.5	1,719	00.0416	28.5	14,466	02.4363
3.0	1,063	00.0508	29.0	15,258	02.5697
3.5			29.5	16,683	02.7037
4.0			30.0	18,274	02.8505
4.5			30.5	24,579	03.0187
5.0	1,121	00.0594	31.0	26,769	03.2042
5.5	682	00.0670	31.5	23,781	03.3952
6.0	1,014	00.0758	32.0	17,797	03.5970
6.5			32.5	17,322	03.8202
7.0			33.0	29,134	04.0542
7.5	,866	00.0839	33.5	34,110	04.2889
8.0	1,026	00.0921	34.0	25,524	04.5176
8.5			34.5	31,421	04.7298
9.0	,985	00.1019	35.0	24,233	04.9196
9.5			35.5	12,392	05.0868
10.0			36.0	19,777	05.2456
10.5			36.5	24,412	05.4159
11.0			37.0	22,502	05.6360
11.5	5,441	00.1162	37.5	45,073	05.9282
12.0	1,844	00.1343	38.0	40,367	06.2524
12.5	2,394	00.1536	38.5	26,491	06.5561
13.0	8,132	00.1717	39.0	58,945	06.8187
13.5			39.5	30,147	07.0609
14.0	6,134	00.1877	40.0	18,157	07.3136
14.5	1,172	00.2026	40.5	28,700	07.5877
15.0	1,853	00.2174	41.0	35,449	07.8724
15.5	1,897	00.2325	41.5	45,165	08.1795
16.0	1,044	00.2485	42.0	24,497	08.5313
16.5	2,253	00.2662	42.5	46,589	08.9055
17.0	12,815	00.2886	43.0	48,541	09.2686
17.5	1,578	00.3190	43.5	26,688	09.6093
18.0	4,292	00.3678	44.0	29,047	09.9361
18.5	12,749	00.4453	44.5	40,821	10.2596
19.0	11,434	00.5372	45.0	39,616	10.6137
19.5	5,987	00.6271	45.5	68,290	11.0275
20.0	12,545	00.7131	46.0	55,092	11.4700
20.5	6,937	00.7972	46.5	35,198	11.9125
21.0	10,469	00.8812	47.0	55,944	12.3348
21.5	12,657	01.9622	47.5	78,806	12.7151
22.0	9,208	01.0367	48.0	44,209	13.0708
22.5	6,722	01.1082	48.5	43,787	13.4202
23.0	15,310	01.1796	49.0	31,696	13.7634
23.5	2,381	01.2534	49.5	35,160	14.1187
24.0	10,414	01.3321	50.0	40,431	14.5033
24.5	9,196	01.4150	50.5	64,575	14.9025
25.0	31,921	01.5016			
25.5	10,993	01.6032			

TABLE C-39 (Continued)

Score	Unsmoothed Frequency	Cumm % of Smoothed	Score	Unsmoothed Frequency	Cumm % of Smoothed
51.0	49,706	15.3017	78.0	75,194	52.5297
51.5	37,356	15.6987	78.5	127,810	53.4585
52.0	69,018	16.0912	79.0	115,642	54.3874
52.5	29,971	16.4814	79.5	111,955	55.3339
53.0	48,583	16.8716	80.0	134,060	56.3160
53.5	104,971	17.2753	80.5	124,488	57.3159
54.0	34,586	17.7062	81.0	77,996	58.3556
54.5	64,255	18.1507	81.5	157,046	59.4840
55.0	55,337	18.5951	82.0	146,822	60.6696
55.5	57,710	19.0443	82.5	151,167	61.8887
56.0	45,683	19.5031	83.0	165,300	63.1571
56.5	99,076	19.9622	83.5	160,986	64.4563
57.0	38,246	20.4146	84.0	182,792	65.7681
57.5	60,229	20.8668	84.5	135,014	67.0341
58.0	32,228	21.3211	85.0	172,630	68.1946
58.5	58,763	21.8019	85.5	134,495	69.2636
59.0	67,556	22.3356	86.0	116,322	70.2767
59.5	70.214	22.8959	86.5	121,485	71.2525
60.0	64,323	23.4561	87.0	136,745	72.2282
60.5	78,570	29.0120	87.5	91,438	73.1983
61.0	58,868	24.5578	88.0	126,783	74.1570
61.5	96,975	25.1113	88.5	112,330	75.1100
62.0	46,677	25.6924	89.0	118,661	76.0631
62.5	78,346	26.2879	89.5	90,076	77.0161
63.0	47,457	26.8927	90.0	186,649	77.9740
63.5	83,012	27.5699	90.5	123,876	78.9414
64.0	104,510	28.4009	91.0	121,052	79.9137
64.5	128,980	29.3597	91.5	84,899	80.8860
65.0	121,885	30.3386	92.0	141,390	81.8582
65.5	69,979	31.2665	92.5	119,628	82.8256
66.0	113,507	32.1428	93.0	143,721	83.7832
66.5	106,931	33.0016	93.5	75,924	84.7150
67.0	101,580	33.8751	94.0	154,993	85.6042
67.5	116,566	34.7777	94.5	101,651	86.4722
68.0	114,205	35.6950	95.0	109,049	87.3520
68.5	118,907	36.5763	95.5	112,986	88.2555
69.0	99,885	37.3857	96.0	157,389	89.1709
69.5	71,378	38.1592	96.5	72,026	90.0863
70.0	59,367	38.9488	97.0	199,462	91.0016
70.5	119,015	39.7707	97.5	81,626	91.8707
71.0	115,688	40.6087	98.0	155,458	92.6471
71.5	103,230	41.4466	98.5	56,677	93.3773
72.0	104,332	42.2846	99.0	144,155	94.1074
72.5	81,166	43.1226	99.5	38,709	94.8209
73.0	136,764	43.9605	100.0	89,921	95.4990
73.5	132,370	44.7985	100.5	77,648	96.1492
74.0	109,089	45.6400	101.0	112,462	96.7819
74.5	94,527	46.4885	101.5	49,836	97.4061
75.0	60,297	47.3406	102.0	126,166	98.0298
75.5	88,323	48.1927	102.5	29,669	98.5976
76.0	108,394	49.0447	103.0	101,298	99.0132
76.5	106,088	49.8968	103.5	10,260	99.2914
77.0	65,952	50.7489	104.0	77,924	99.5280
77.5	145,920	51.6201	104.5	10,165	99.7640
			105.0	29,384	100.0000

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a. S3RSSH

APPENDIX D

DISTRIBUTIONS OF THE TESTS USED DURING WWII

APPENDIX D

DISTRIBUTIONS OF THE TESTS USED DURING WWII

This appendix presents the frequency distributions of the enlisted classification tests used during WWII. The Army and Marine Corps administered the Army General Classification Test (AGCT) to all enlisted accessions, and the Navy administered the Navy General Classification Test (NGCT). The Army used literacy tests to screen men who did not complete the third grade of elementary school or who had low AGCT scores. Induction standards prior to June 1942 excluded illiterates. Between June 1942 and August 1943 illiterates could be inducted, although the number was restricted. In July 1943 the restriction on the number of illiterates was removed, and they were sent to special training units. The number of special trainees with AGCT scores was 267,310; all of these were tested with the AGCT at the completion of their special training. Of the 267,310 men, 90,177 had also been tested previously at reception centers [D-1]. Although the score distributions in this appendix are subject to administrative vagaries, they are generally accurate.

Table D-1 shows the cumulative distributions for each service and the total tested during WWII [D-2]. These distributions include both officers and enlisted men. The scores for all men who completed special training are included. No females are included. The final column shows the smoothed percentile scores corresponding to AGCT standard scores. This relationship between standard scores and percentile scores, shown in greater detail in table A-8 of appendix A, has been used to construct the score scales for all versions of the AFQT and for the Army and Marine Corps aptitude composites. Table D-1 displays the data that were used to construct the WWII scale.

Table D-2 shows the percentage of Army enlisted men tested with the AGCT at reception centers. These distributions include men assigned to the Air Force, which during WWII was part of the Army. Enlisted men who subsequently became officers are included in the distribution, but officers with direct commissions are not. The AGCT scores of illiterates tested at reception centers are included. The remaining 177,133 men assigned to specialized training probably are not included. They perhaps were identified at induction stations as illiterate and were not tested with the AGCT during their initial processing at reception centers.

TABLE D-1

PROPORTIONAL DISTRIBUTION OF AGCT STANDARD SCORES FOR TOTAL STRENGTH OF ARMED FORCES AS OF 31 DECEMBER 1944

AGCT Standard Score (1)	Army-Air Force (2)	Navy (3)	Marines (4)	Total (5)	Cumulative (6)	Smoothed Percentiles (7)
160 and up	.000020	.001199	.000004	.001223	1.000000	1.00
155-159	.000271	.000636	.000012	.000919	.998777	1.00
150-154	.001449	.001410	.000041	.002900	.997858	1.00
145-149	.002899	.003345	.000086	.006330	.994958	1.00
140-144	.006523	.004466	.000168	.011157	.988628	.99
135-139	.012321	.007640	.000438	.020399	.977471	.98
130-134	.018989	.008186	.000667	.027842	.957072	.96
125-129	.034064	.020319	.001669	.056052	.929230	.92
120-124	.046965	.018632	.002627	.068224	.873178	.87
115-119	.049284	.025002	.003781	.078067	.804954	.80
110-114	.059432	.033328	.004754	.097514	.726887	.73
105-109	.056709	.022608	.005523	.084840	.629373	.63
100-104	.053008	.028291	.003906	.085205	.544533	.55
95-99	.049042	.026565	.004170	.079777	.459328	.47
90-94	.043622	.022821	.003060	.069503	.379551	.37
85-89	.042961	.016189	.002618	.061768	.310048	.30
80-84	.037013	.014347	.001534	.052894	.248280	.26
75-79	.034369	.009598	.001383	.045350	.195386	.20
70-74	.031196	.007355	.000990	.039541	.150036	.15
65-69	.026437	.001989	.000676	.029102	.110495	.12
60-64	.022472	.002838	.000423	.025733	.081398	.09
55-59	.018507	.001894	.000177	.020578	.055660	.06
50-54	.013219	.000555	.000060	.013834	.035082	.04
45-49	.008394	.000353	.000038	.008785	.021248	.02
40-44	.012228	.000171	.000064	.012463	.013463	.02
TOTAL	.681394	.279737	.038869	1.000000		

NOTE: Reproduced from [D-2].

The scores in table D-2 are grouped by AGCT mental grade. (The AGCT mental grades are described in appendix A.) Both the percentage and frequency in each grade are shown. The distributions are grouped by time periods that have similar policies related to test scores. The time periods are:

- *Jun-Aug 1941* — Prior to mobilization; peacetime draft in effect. These figures may not include all accessions during the period.

- *Sep 1941-Jul 1942* — Mobilization just before and after America's involvement in WWII. These figures do not include all accessions during the period. In July 1942 the lower boundary of mental grade IV was lowered from 70 to 60.

- *Aug 1942-Jul 1943* — In July 1943, the Army removed the ban on the induction of illiterates, although the number was restricted. Scores for illiterates are included in the distributions prior to August 1943.

- *Aug 1943-Jul 1944* — Illiterate inductees were sent to special training units. Scores for most illiterates are probably not included in the distributions.

- *Aug 1944-Apr 1945* — The buildup of the Army was slowing down.

- *Jun 1941-Apr 1945* — Total number of enlisted recruits.

The number of men inducted into the Army varied greatly during WWII. The peak period was from October 1942 through March 1943, when over 300,000 men were tested with the AGCT each month. The peak month was November 1942, with 497,575 men tested.

The distributions are shown for whites, blacks, and total. The percentage of blacks in grades IV and V showed a large change during the war. In the early part of the war up to 60 percent of the black accessions were in grade V. In August 1943, the percentage dropped to 6. After that it stabilized between 25 and 30 percent. These changes probably reflect induction policies.

Table D-3 shows AGCT score distributions for the three forces of the Army during WWII: Air Force, Ground Force, and Service Force. Test scores were recorded only from January 1943 through May 1944. As for table D-2, the months that had similar policies are grouped together: January through July 1943 and August 1943 through May 1944.

TABLE D-2

WWII AGCT DISTRIBUTION BY RACE AND MENTAL GRADE[a]

Period	Percent in mental grade				
	MGI	MGII	MGIII	MGIV[b]	MGV[b]
White					
Jun 1941 – Aug 1941	11.2	33.4	30.0	17.7	7.7
Sep 1941 – Feb 1942	7.6	29.2	32.7	21.6	8.9
May 1942 – Jul 1942[c]	7.9	28.7	32.1	20.6	10.8
Aug 1942 – Jul 1943	5.7	27.8	32.9	27.7	5.8
Aug 1943 – Jul 1944	7.1	31.9	32.5	27.3	1.2
Aug 1944 – Apr 1945	4.2	25.9	34.4	33.6	1.9
Jun 1941 – Apr 1945	6.3	28.7	32.8	27.0	5.2
Black					
Jun 1941 – Aug 1941	0.5	4.9	14.8	29.7	50.2
Sep 1941 – Feb 1942	0.6	5.0	17.4	31.5	45.5
May 1942 – Jul 1942[c]	0.3	3.3	12.4	26.1	57.9
Aug 1942 – Jul 1943	0.2	2.9	11.5	44.3	41.1
Aug 1943 – Jul 1944	0.2	3.3	12.7	64.6	19.1
Aug 1944 – Apr 1945	0.1	2.3	10.6	63.4	23.6
Jun 1941 – Apr 1945	0.2	3.2	12.2	48.4	35.9
Total					
Jun 1941 – Aug 1941	10.1	30.4	28.4	18.9	12.1
Sep 1941 – Feb 1942	6.9	26.8	31.1	22.6	12.5
May 1942 – Jul 1942[c]	7.3	26.7	30.5	21.1	14.5
Aug 1942 – Jul 1943	5.2	25.3	30.7	29.4	9.4
Aug 1943 – Jul 1944	6.2	28.1	29.9	32.3	3.6
Aug 1944 – Apr 1945	3.9	24.1	32.6	35.9	3.6
Jun 1941 – Apr 1945	5.6	26.0	30.7	29.2	8.4

TABLE D-2 (Continued)

Period	Frequency in mental grade				
	MGI	MGII	MGIII	MGIV[b]	MGV[b]

White

Period	MGI	MGII	MGIII	MGIV[b]	MGV[b]
Jun 1941 – Aug 1941	15,541	46,111	41,453	24,442	10,635
Sep 1941 – Feb 1942	28,129	108,150	120,974	80,148	32,937
May 1942 – Jul 1942[c]	46,351	169,278	189,143	121,667	63,428
Aug 1942 – Jul 1943	207,448	1,007,279	1,192,216	1,004,314	210,658
Aug 1943 – Jul 1944	87,862	396,829	404,632	339,281	14,692
Aug 1944 – Apr 1945	25,842	158,570	211,037	205,983	11,658
Jun 1941 – Apr 1945	411,173	1,886,217	2,159,455	1,775,835	344,008

Black

Period	MGI	MGII	MGIII	MGIV[b]	MGV[b]
Jun 1941 – Aug 1941	73	788	2,376	4,765	8,064
Sep 1941 – Feb 1942	252	2,035	7,120	12,928	18,657
May 1942 – Jul 1942[c]	130	1,656	6,248	13,157	29,141
Aug 1942 – Jul 1943	845	12,021	47,660	182,537	169,751
Aug 1943 – Jul 1944	480	6,431	24,494	124,210	36,629
Aug 1944 – Apr 1945	74	1,175	5,361	32,144	11,979
Jun 1941 – Apr 1945	1,854	24,106	93,259	369,741	274,221

Total

Period	MGI	MGII	MGIII	MGIV[b]	MGV[b]
Jun 1941 – Aug 1941	15,614	46,899	43,829	29,211	18,699
Sep 1941 – Feb 1942	28,381	110,185	128,094	93,076	51,594
May 1942 – Jul 1942[c]	46,481	170,934	195,391	134,824	92,569
Aug 1942 – Jul 1943	208,293	1,019,300	1,239,876	1,186,851	38 0,409
Aug 1943 – Jul 1944	88,342	403,260	429,126	463,491	51,321
Aug 1944 – Apr 1945	25,916	159,745	216,398	238,127	23,637
Jun 1941 – Apr 1945	413,027	1,910,323	2,252,714	2,145,580	61 8,229

a. Includes Army and Air Force enlisted recruits. See appendix A for definition of mental grades.
b. The upper bound of Mental Grade V was lowered from the AGCT score of 69 to 59 in July 1942.
c. March and April 1942 data were not available.

The Army was organized in 1942 into three forces. The Ground Force consisted of 87 combat divisions. The Service Force was responsible for supply, procurement, and general housekeeping. It included the technical jobs, such as medical, transportation, quartermaster, ordnance, fiscal, corps of engineers, and administration. In addition, it conducted basic training and ran the reception centers. The Army Air Force included all responsibilities connected with conducting air warfare. The division of responsibilities was not clear, and the forces were often competitive. An especially troublesome issue was the allocation of manpower. From the beginning, the Ground Force was concerned that it did not receive a fair share of the high-quality men. This concern persisted throughout the 1950s, and it was finally partially resolved when the Army adopted an automated system for allocating inductees to skill training courses. The automated system tended to equalize the aptitudes across skills.

The AGCT distributions in table D-3 show that the Service Force and Air Force did receive a higher proportion of men in AGCT grades I and II and the Ground Force received more in grades IV and V. The percentages, of course, do not say what a fair distribution should be; they only describe what happened. The situation still persists today that the aptitudes of Air Force recruits are higher than those of Army recruits.

In tables D-4 and D-5, the AGCT scores are shown by region of the country. For administrative purposes, the United States was divided into nine Corps Areas or Army Service Commands. The States in the Service Commands are:

1   Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut

2   New York, New Jersey, Delaware

3   Pennsylvania, Maryland, District of Columbia, Virginia

4   North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi

5   West Virginia, Ohio, Indiana, Kentucky

6/7   Michigan, Wisconsin, Minnesota, Illinois, Iowa, North Dakota, South Dakota, Nebraska, Kansas, Missouri, Wyoming, Colorado

8   Arkansas, Louisiana, Oklahoma, Texas

9   Montana, Idaho, Washington, Oregon, Utah, Nevada, Arizona, California

TABLE D-3

WWII AGCT DISTRIBUTION BY ARMY FORCE AND MENTAL GRADE

Period	Percent in mental grade				
	MGI	MGII	MGIII	MGIV	MGV
Army Air Force					
Jan 1943 – Jul 1943	6.7	32.7	32.7	22.6	5.3
Aug 1943 – May 1944	10.3	43.8	26.6	16.1	3.2
Army Ground Force					
Jan 1943 – Jul 1943	4.7	25.2	32.9	30.9	6.3
Aug 1943 – May 1944	4.1	23.8	33.8	36.6	1.8
Army Service Force					
Jan 1943 – Jul 1943	7.4	27.9	28.5	27.5	8.7
Aug 1943 – May 1944	7.1	26.5	26.5	34.4	5.4
Frequency in mental grade					
Army Air Force					
Jan 1943 – Jul 1943	31,382	154,354	154,051	106,666	25,079
Aug 1943 – May 1944	24,030	101,902	61,865	37,583	7,393
Army Ground Force					
Jan 1943 – Jul 1943	35,150	190,104	247,940	233,312	47,350
Aug 1943 – May 1944	22,711	134,306	190,698	206,922	10,161
Army Service Force					
Jan 1943 – Jul 1943	54,131	204,804	209,667	202,261	63,954
Aug 1943 – May 1944	33,510	124,209	124,322	161,518	25,553

TABLE D-4

WWII AGCT DISTRIBUTION BY SERVICE COMMAND AND MENTAL GRADE
(percent)

Service command	White				
	MGI	MGII	MGIII	MGIV	MGV
Jun 1943 – Jul 1943					
1st	10.2	39.8	34.3	15.3	0.4
2nd	13.6	39.9	29.4	15.7	1.4
3rd	9.4	35.6	31.8	21.1	2.1
4th	6.1	25.6	29.7	32.3	6.4
5th	8.7	32.3	31.1	24.0	3.9
6th	13.0	39.7	30.2	16.3	0.8
7th	14.6	38.5	29.3	16.2	1.4
8th	6.5	27.3	29.1	31.7	5.4
9th	10.0	36.4	31.5	19.8	2.3
Aug 1943 – May 1944					
1st	6.8	35.8	36.2	21.0	0.3
2nd	8.2	37.7	34.0	19.7	0.5
3rd	6.2	30.8	35.1	27.2	0.8
4th	3.5	19.6	28.5	46.5	2.0
5th	5.9	28.1	32.0	31.7	2.3
6th	11.0	39.5	31.5	17.6	0.4
7th	9.6	36.1	32.0	22.0	0.3
8th	3.7	22.4	30.2	41.0	2.7
9th	9.0	37.9	31.8	20.8	0.5
Jun 1944 – Jan 1945					
1st	4.7	31.5	40.5	22.9	0.5
2nd	7.8	34.2	35.4	21.9	0.8
3rd	4.5	27.5	36.5	29.8	1.6
4th	1.7	12.4	27.2	52.8	5.9
5th	3.7	24.5	33.4	35.7	2.6
6th	6.8	32.5	36.0	24.1	0.6
7th	5.6	28.5	35.0	29.9	1.1
8th	2.4	17.2	30.7	46.1	3.5
9th	5.0	32.4	37.0	25.0	0.7

Service command	Black				
	MGI	MGII	MGIII	MGIV	MGV
Jun 1943 – Jul 1943					
1st	0.5	14.7	41.4	40.6	2.7
2nd	0.4	7.4	27.1	53.0	12.2
3rd	0.4	5.4	16.3	55.5	22.5
4th	0.2	2.7	5.7	50.1	41.4
5th	0.5	5.8	22.2	56.5	15.0
6th	1.1	10.4	27.1	55.9	5.5
7th	0.7	9.2	24.7	48.7	16.7
8th	0.1	1.9	9.9	55.8	32.3
9th	0.8	7.6	19.6	57.0	15.0
Aug 1943 – May 1944					
1st	0.6	7.9	30.5	58.0	3.0
2nd	0.3	6.3	24.6	61.5	7.3
3rd	0.3	4.7	16.9	66.2	11.9
4th	0.0	0.8	4.0	66.4	28.7
5th	0.4	4.3	19.1	62.4	13.8
6th	0.9	8.2	23.2	61.1	6.6
7th	0.8	6.8	21.8	66.5	4.2
8th	0	0.9	5.4	69.4	24.3
9th	0.3	4.9	19.5	68.4	6.9
Jun 1944 – Jan 1945					
1st	0.2	6.1	32.8	57.0	3.9
2nd	0.6	5.5	20.2	59.1	14.7
3rd	0.2	2.9	13.6	63.7	19.7
4th	0	0.4	2.8	54.4	42.3
5th	0.3	5.4	19.7	61.2	13.4
6th	0.2	6.0	19.5	61.1	13.2
7th	0.6	5.9	18.9	60.0	14.7
8th	0	0.8	4.4	63.0	31.8
9th	0.2	4.5	20.9	66.4	8.0

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Service command	Total				
	MGI	MGII	MGIII	MGIV	MGV
Jun 1943 – Jul 1943					
1st	10.1	39.4	34.4	15.7	0.4
2nd	12.6	37.5	29.2	18.5	2.2
3rd	7.9	30.5	29.2	26.9	5.5
4th	4.3	18.8	22.6	37.5	16.8
5th	7.9	29.8	30.2	27.1	4.9
6th	12.2	37.5	30.0	19.2	1.1
7th ·	14.1	37.3	29.1	17.5	2.0
8th	5.2	22.4	25.5	36.3	10.6
9th	9.6	35.3	31.0	21.2	2.8
Aug 1943 – May 1944					
1st	6.6	35.0	36.0	22.0	0.4
2nd	7.3	34.3	32.9	24.2	1.2
3rd	5.2	26.3	32.0	33.9	2.7
4th	2.4	13.5	20.6	52.9	10.6
5th	5.4	25.9	30.8	34.5	3.4
6th	10.1	36.7	30.8	21.5	0.9
7th	9.2	34.7	31.6	24.0	0.5
8th	2.9	17.8	24.9	47.1	7.3
9th	8.5	36.0	31.1	23.6	0.9
Jun 1944 – Jan 1945					
1st	4.6	31.1	40.3	23.4	0.5
2nd	7.3	32.2	34.4	24.4	1.7
3rd	4.0	24.2	33.4	34.4	4.0
4th	1.3	9.5	21.2	53.2	14.8
5th	3.6	23.6	32.7	37.0	3.2
6th	6.5	31.1	35.2	26.0	1.2
7th	5.6	28.5	35.0	29.9	1.1
8th	2.1	15.2	27.6	48.2	6.9
9th·	4.8	31.7	36.5	26.1	0.9

TABLE D-5

WWII AGCT DISTRIBUTION BY SERVICE COMMAND AND MENTAL GRADE
(Frequency)

Service command	White				
	MGI	MGII	MGIII	MGIV	MGV
Jun 1943 – Jul 1943					
1st	2,620	10,171	8,757	3,923	90
2nd	7,675	22,604	16,606	8,896	795
3rd	4,236	16,044	14,340	9,535	943
4th	1,915	8,118	9,388	10,208	2,023
5th	3,246	12,020	11,563	8,942	1,440
6th	6,801	20,673	15,742	8,496	414
7th	4,700	12,385	9,413	5,212	435
8th	1,700	7,191	7,677	8,349	1,435
9th	2,933	10,692	9,256	5,825	687
Aug 1943 – May 1944					
1st	5,251	27,746	28,031	16,262	215
2nd	12,968	59,820	53,857	31,163	772
3rd	8,752	43,725	49,889	38,713	1,113
4th	3,831	21,632	31,449	51,388	2,227
5th	8,093	38,540	43,916	43,578	3,220
6th	17,660	63,341	50,597	28,333	599
7th	11,028	41,372	36,708	25,178	315
8th	3,556	21,634	29,108	39,534	2,556
9th	8,667	36,637	30,763	20,119	477
Jun 1944 – Jan 1945					
1st	1,354	9,089	11,671	6,595	132
2nd	4,166	18,185	18,842	11,638	408
3rd	2,983	18,072	23,951	19,561	1,046
4th	1,199	8,880	19,476	37,875	4,248
5th	2,240	14,739	20,077	21,492	1,586
6th	4,308	20,571	22,803	15,254	372
7th	3,510	17,973	22,060	18,854	713
8th	1,241	8,852	15,810	23,747	1,816
9th	3,156	20,616	23,509	15,884	453

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	Black				
Service command	MGI	MGII	MGIII	MGIV	MGV
Jun 1943 – Jul 1943					
1st	2	54	152	149	10
2nd	18	335	1,229	2,407	554
3rd	34	490	1,490	5,085	2,058
4th	20	360	760	6,683	5,524
5th	20	226	873	2,216	587
6th	46	433	1,128	2,330	231
7th	10	124	333	657	226
8th	7	119	613	3,466	2,007
9th	9	89	231	671	177
Aug 1943 – May 1944					
1st	13	175	677	1,285	67
2nd	63	1,221	4,791	12,004	1,429
3rd	85	1,376	4,935	19,363	3,491
4th	21	424	2,134	35,079	15,153
5th	49	577	2,572	8,387	1,862
6th	141	1,288	3,666	9,653	1,044
7th	42	380	1,216	3,717	234
8th	12	232	1,403	18,159	6,362
9th	19	297	1,173	4,108	413
Jun 1944 – Jan 1945					
1st	1	28	151	262	18
2nd	23	211	776	2,275	565
3rd	20	300	1,394	6,544	2,023
4th	3	96	655	12,677	9,853
5th	8	162	594	1,845	405
6th	7	208	676	2,121	459
7th	8	78	252	797	195
8th	4	56	307	4,410	2,227
9th	4	79	365	1,161	140

Service command	Total				
	MGI	MGII	MGIII	MGIV	MGV
Jun 1943 – Jul 1943					
1st	2,622	10,225	8,909	4,072	100
2nd	7,693	22,939	17,835	11,303	1,349
3rd	4,270	16,534	15,830	14,620	3,001
4th	1,935	8,478	18,148	16,891	7,547
5th	3,266	12,246	12,436	11,158	2,027
6th	6,847	21,106	16,870	10,826	645
7th	4,710	12,509	9,746	5,869	661
8th	1,707	7,310	8,290	11,815	3,442
9th	2,942	10,781	9,487	6,496	864
Aug 1943 – May 1944					
1st	5,264	27,921	28,708	17,547	282
2nd	13,031	61,041	58,648	43,167	2,201
3rd	8,837	45,101	54,824	58,076	4,604
4th	3,852	22,056	33,583	86,467	17,380
5th	8,142	39,117	46,488	51,965	5,082
6th	17,801	64,629	54,263	37,986	1,643
7th	11,070	41,752	37,924	28,895	549
8th	3,568	21,866	30,511	57,693	8,918
9th	8,686	36,934	31,936	24,227	890
Jun 1944 – Jan 1945					
1st	1,355	9,117	11,822	6,857	150
2nd	4,189	18,396	19,618	13,913	973
3rd	3,003	18,372	25,345	26,105	3,069
4th	1,202	8,976	20,131	50,552	14,101
5th	2,248	14,901	20,671	23,337	1,991
6th	4,315	20,779	23,479	17,375	831
7th	3,510	17,973	22,060	18,854	713
8th	1,245	8,908	16,117	28,157	4,043
9th	3,160	20,695	23,874	17,045	593

The States in commands 6 and 7 could not be separated. The time periods used are:

- June-July 1943

- August 1943-May 1944

- June 1944-January 1945.

No scores were available by geographical region outside of these periods. The regional differences during WWII are similar to those found in 1980 [D-3].

The AGCT score distributions are presented because of their historical interest. The original data exist in handwritten form on large sheets of paper. The sheets are not signed or dated, but obviously they were kept as running records of the number of men in each AGCT grade. Presentation of the detailed monthly figures seemed too cumbersome, so only the summaries are presented here.

The frequencies that led to table D-2 were obtained from several different tallies, and there is no consistency among the sources. The actual number of Army recruits during WWII may be a million more than shown in table D-2 (8,628,991 versus 7,339,873), or even higher, depending on the source and period used. The percentages in each mental grade, however, differ only by trivial amounts (a maximum of 2 percent for blacks in category IV, which had large variations across time periods anyway).

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APPENDIX E

THE STABILITY OF THE WWII SCALE

APPENDIX E

THE STABILITY OF THE WWII SCALE

The Army General Classification Test (AGCT) was used as the reference test to scale all forms of the Armed Forces Qualification Test (AFQT), from 1950 until 1960, to the World War II (WWII) score scale [E-1]. When new forms of the AFQT were introduced in 1953, 1956, and 1960, the score distributions of registrants for induction were carefully examined for abrupt shifts. The transitions were smooth, and the conclusion is that during the decade there was no discernible slippage in the WWII scale.

Forms 7 and 8 of the AFQT (AFQT 7/8) were used from 1960 until the mid 1970s, when they were replaced by the Armed Services Vocational Aptitude Battery (ASVAB) and service-specific test batteries. AFQT 7/8 was administered to millions of young men during the Vietnam period, which for these purposes covers fiscal years 1966 through 1971. The percentages of registrants for induction in AFQT categories, shown by fiscal year, are presented in table E-1. Fiscal years 1964 and 1965 are also included to show how the AFQT score distributions shifted when the draft became more representative as the military manpower requirements increased.

The percentages in each category remained relatively stable from fiscal year 1966 (July 1, 1965 through June 30, 1966) through fiscal year 1971 (October 1, 1970 through September 30, 1971). Fiscal year 1970 contains 15 months (July 1, 1969 through September 30, 1970). The population of registrants for the draft did shift during these years, as shown by the growing percentage of examinees found physically unqualified:

Fiscal year	Percentage physically unqualified
1966	24
1967	27
1968	30
1969	34
1970	35
1971	42

TABLE E-1

DISTRIBUTIONS OF AFQT SCORES DURING THE VIETNAM PERIOD FOR REGISTRANTS FOR THE DRAFT

| AFQT category | Mentally qualified | Unqualified | | Total | Percent |
		Physical	Mental		
		Fiscal year 1964			
I	40,997	20,991		61,988	6.2
II	165,009	84,205		249,214	24.9
III	198,903	101,335		300,238	30.0
IV	67,617	34,503	116,179	218,299	21.8
V			172,367	172,367	17.2
Total	472,526	241,034	288,546	1,002,106	
		Fiscal year 1965			
I	32,028	14,595		46,623	5.1
II	163,924	70,454		234,378	25.7
III	209,618	87,785		297,403	32.7
IV	65,260	27,299	82,667	175,226	19.2
V			157,227	157,227	17.3
Total	470,830	200,133	239,894	910,857	
		Fiscal year 1966			
I	83,672	33,960		117,632	7.1
II	358,354	145,428		503,782	30.3
III	410,829	167,002		577,831	34.7
IV	131,191	53,137	106,686	291,014	17.5
V			173,437	173,437	10.4
Total	984,046	399,527	280,123	1,663,696	
		Fiscal year 1967			
I	59,731	25,464		85,195	8.1
II	236,561	100,456		337,017	32.0
III	243,595	103,255		346,850	32.9
IV	119,000	50,648	31,939	201,587	19.1
V			82,956	82,956	7.9
Total	658,887	279,823	114,895	1,053,605	

AFQT category	Mentally qualified	Unqualified		Total	Percent
		Physical	Mental		
		Fiscal year 1968			
I	58,912	30,251		89,163	7.6
II	230,784	117,838		348,622	29.6
III	258,486	132,260		390,746	33.1
IV	139,374	71,406	19,991	230,771	19.6
V			119,665	119,665	10.1
Total	687,556	351,755	139,656	1,178,967	
		Fiscal year 1969			
I	50,963	31,689		82,652	8.1
II	196,164	121,534		317,698	31.1
III	205,211	126,757		331,968	32.5
IV	110,311	68,254	13,474	192,039	18.8
V			97,560	97,560	9.5
Total	562,649	348,234	111,034	1,021,917	
		Fiscal year 1970			
I	66,809	41,742		108,551	8.0
II	278,119	175,032		453,151	33.4
III	283,125	177,878		461,003	34.0
IV	126,497	79,689	15,945	222,131	16.4
V			111,816	111,816	8.2
Total	754,550	474,341	127,761	1,356,652	
		Fiscal year 1971			
I	30,811	25,358		56,169	7.7
II	137,157	113,348		250,505	34.3
III	140,948	116,403		257,351	35.3
IV	61,025	50,411	7,120	118,556	16.2
V			47,423	47,423	6.5
Total	369,941	305,520	54,543	730,004	

The change in percentage of registrants found physically unqualified increased proportionally by AFQT category.

During the Vietnam period, many young men enlisted to avoid being drafted. (These were called draft-induced volunteers.) The percentage of the total number of enlisted accessions during the Vietnam period for all services combined is presented in table E-2. As was true for the registrants, the percentage in each AFQT category remained relatively stable from fiscal years 1966 through 1971.

The conclusion drawn from tables E-1 and E-2 is that the percentages are reasonably accurate indicators of the aptitudes of young adult males during that period.

EQUATING AFQT 7 AND AGCT IN A SAMPLE OF MALE HIGH SCHOOL STUDENTS

AGCT and AFQT 7 were administered in counterchanged order to two samples of male high school students in grades 11 and 12 [E-2]. The cumulative frequency distributions for each test in each order of administration (administered first or second) is shown in figure E-1 (also shown earlier as figure 3-1). The order of test administration had relatively little effect on the AGCT scores. When the AGCT was given first, the scores were sightly lower than when given second. For example, 50 percent of the sample had AGCT scores of 50 or above when it was given first, compared to 54 percent when it was given second.

The effects of testing order on AFQT 7 scores were just the opposite. When AFQT was given first, the scores were substantially higher than when given second. For example, 51 percent of the sample had AFQT 7 scores of 50 or above when it was given first, compared to only 39 percent when it was given second. Contrary to the usual effects of testing order, there was a pronounced interaction between test and order. Usually both tests are affected equally, and the results are pooled for the different orders. The data were collected in 1980, and there is no certain way of explaining the interaction effects.

As is apparent in figure E-1, the aberrant set of scores is for the AFQT 7 when it was administered after the AGCT. The other three sets of scores are reasonably similar and support the stability of the WWII scale from the AGCT

DISTRIBUTIONS OF AFQT SCORES FOR ENLISTED ACCESSIONS
DURING THE VIETNAM PERIOD

AFQT category	Inductees	Enlistees	Total	Percent	Inductees	Enlistees	Total	Percent
		FY 1964				FY 1965		
I	7,882	21,765	29,647	6.3	4,611	17,381	21,992	5.5
II	38,574	112,848	151,422	32.1	25,057	100,449	125,476	31.3
III	61,023	161,018	222,041	47.1	42,117	153,900	196,017	48.8
IV	41,519	24,483	66,002	14.0	29,549	26,787	56,336	14.0
ADMIN[a]	2,235	–	2,235	.5	1,603	–	1,603	.4
Total	151,233	320,114	471,347		102,937	298,487	401,424	
		FY 1966				FY 1967		
I	14,866	41,602	56,468	6.4	14,776	34,440	49,216	6.6
II	89,640	204,193	293,833	33.5	80,134	168,569	248,703	33.1
III	148,537	233,102	381,639	43.5	120,510	170,282	290,792	38.7
IV	86,822	54,072	140,894	16.0	77,077	79,441	156,518	20.8
ADMIN	4,920	–	4,920	.6	6,301	–	6,301	.8
Total	344,785	532,969	877,754		298,798	452,732	751,530	
		FY 1968				FY 1969		
I	15,886	33,853	49,739	6.0	15,222	33,218	48,440	6.2
II	88,257	175,743	264,000	31.8	73,023	173,629	246,652	31.7
III	135,817	177,010	312,827	37.6	101,257	192,892	294,149	37.7
IV	96,686	100,925	196,511	23.6	67,030	117,436	184,466	23.7
ADMIN	8,051	–	8,051	1.0	5,338	–	5,338	.7
Total	343,597	487,531	831,128		261,870	517,175	779,045	
		FY 1970				FY 1971		
I	10,691	21,075	31,766	5.3	8,611	17,952	26,563	5.1
II	57,145	123,428	180,573	30.5	43,645	112,777	156,422	30.0
III	80,246	162,340	242,586	41.0	59,268	165,062	224,330	43.1
IV	53,363	81,427	134,790	22.8	40,787	71,320	112,107	21.5
ADMIN	2,323	–	2,323	.4	1,521	–	1,521	.3
Total	203,768	388,270	592,038		153,882	367,111	520,943	

a. Administrative acceptees included inductees who failed the AFQT but were judged on other grounds to be mentally qualified.

through AFQT 7/8. For these data the AFQT 7 and AGCT scales are approximately equal up to a percentile score of 50. Above that point, the samples of high school students scored relatively higher on the AGCT than on the AFQT. One speculation is that high school students in 1980 know relatively less about tools than did registrants for the draft in 1959, which was the group used originally to place AFQT 7 on the WWII score scale. As a result, their AFQT 7 scores would be relatively lower. The conclusion from these data is that AFQT 7/8 was accurately scaled to the AGCT and that the WWII score scale remained reasonably stable until forms 5/6/7 of the ASVAB were introduced.
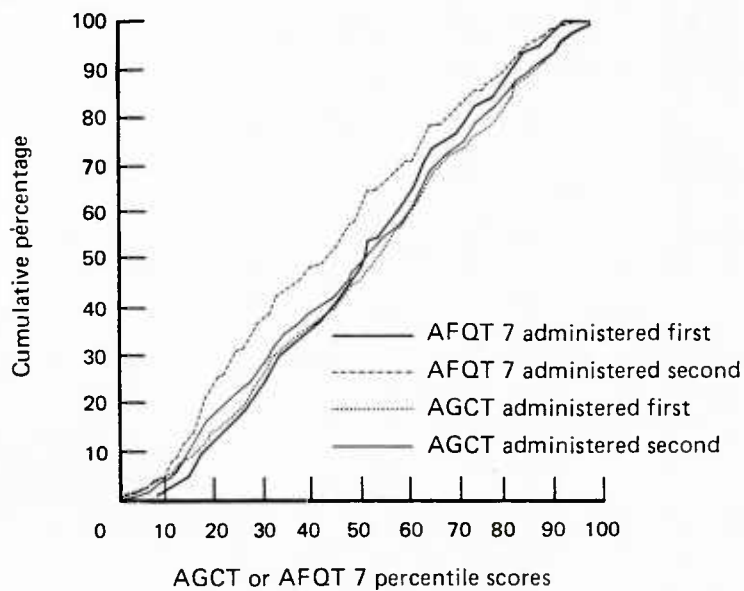

FIG. E-1: CUMULATIVE DISTRIBUTIONS OF AGCT AND
AFQT 7 PERCENTILE SCORES FOR MALE STUDENTS
IN GRADES 11 AND 12

REFERENCES

[E-1]   Army Research Institute, Research Note 132, *Successive AFQT Forms — Comparisons and Evaluations*, by A. G. Bayroff, Unclassified, May 1963

[E-2]   Office of the Secretary of Defense (Directorate of Accession Policy), Technical Memorandum 80-2, *Scaling of the Armed Services Vocational Aptitude Battery Form 7 and the General Classification Test to the Armed Forces Qualification Test Scale*, by R. F. Boldt, Unclassified, Aug 1980

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